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ABSTRACT

Designed to assist instructors to be consistent with the Fair Labor Standards Act, which requires schools to provide safety instruction to students involved in any type of work experience or on-the-job training program, this curriculum guide presents a program to prepare students to perform their job function in a safe and healthy fashion. There are four units of content, each with two or three lesson plans consisting of the time allotment, terminal objectives, list of teaching materials (including transparencies), list of references, two to seven pages of content outline and script, and an examination with a key. The titles of the four instructional units and associated lesson plans are (1) Fire Safety (What Fire Is, Its Hazards, Sources, and Prevention; Recognition of Classes of Fire-Controlling Fire-Extinguishing Fire); (2) Material Handling (Manual Handling of Materials, Machine Handling of Materials, Handling of Hazardous Materials); (3) Safety Guarding (Personal Protective Equipment, Machine Guards); and (4) Housekeeping and Review (Housekeeping, Review and Evaluation). Sixty-five transparency masters, most of them containing drawings or illustrations, are appended. (EM)

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SAFETY AND YOU ON THE JOB

Developed By:

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INTRODUCTION

In order to qualify for employment at sub-minimum wages and not to be in conflict with specific government hazard regulations, students are required to have safety instruction by the school consistent with the Fair Labor Standards Act. The following unit of instruction can be used to provide that instructional requirement.

These instructional units will provide an instructor with the necessary information to present lessons. Accompanying the instruction are numerous transparencies. Objective tests may be kept on file to prove the safety instruction was presented and serve as a record of the student's performance.

Keep in mind that all students involved in any type of work experience or on-the-job training program must be prepared to perform their job function in a safe and healthy fashion consistent with the Fair Labor Standards Act.

John E. Cook, Supervisor
Distributive Education, Cooperative
Education and Work Study Programs

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Block #1 Lesson Plan #1 Page #1

Title Transparency 1-1

Lesson Title: What Fire Is, Its Hazards, Sources, and Prevention.

Clock Hours: 90 minutes

Terminal Objectives: After participating in this presentation the students will be able to demonstrate their knowledge of what fire is, its hazards, sources, and prevention by completing a 10-question multiple choice examination on the subject with 100% accuracy.

Teaching Materials:

1. This lesson plan
2. Transparency pack 1-1
3. Overhead projector
4. Blackboard

References:

Strasser, Aaron, Bohn, Eales - Fundamentals of Safety Education, Macmillan, NY 1965, pp. 332-360.

Accident Prevention Manual for Industrial Operations, National Safety Council, Chicago 1972, pp. 1009-111.

Occupational Safety and Health Standards, Federal Register, Washington D.C., 1910. 157 - 1910.162.

Lesson Outline	Lesson Script
A. What Fire Is:	
Introduction:	Did you ever see a fire and wonder just what it is, what it is made up of, why it keeps burning, and why it goes out. If so, this is natural curiosity and part of the learning process. Also, this knowledge is essential to the understanding of fire protection, fire control, and fire extingui ment. So, let's find out just what fire is by answering the four questions just mentioned.
1. What is a fire?	Definition: A fire is defined as the rapid oxidation of matter in scientific terms.
Teacher Note: Question several students, list their answer -- have the class discuss the answers given and compile them into a class definition--compare class definition with the script definition.	Definition: A fire is defined as the light or heat and especially the flame of something burning in lay terms.
Transparency 1-2	
2. What is fire made up of?	Fire is made up of three components which must be present in the proper proportions in order for it to exist: 1. Oxygen (air) 2. Fuel 3. Heat
Teacher Note: Question students -- list answers-- have class discuss and compile. Compare class answer with script answer.	Explanation: To explain proper proportions give the following examples: a. Paper laying in open air on a desk at room temperature will not burn, but if you add the heat from a burning match it will, (proper proportion). b. Oil in open air at room temperature will not burn, but if you add oxygen you reduce the temperature at which it will burn, and it will burn at room temperature.

Lesson Outline	Lesson Script
3. Why does fire keep burning? Teacher Note: Use a technique as in 2.	The answer is derived from the answer to question 2. Fire will continue to burn so long as all three components are present in the proper proportions to sustain combustion.
4. Why does fire go out? Teacher Note: Use same techniques as in 2.	The answer is derived from the answers to questions 2 & 3. Fire can no longer exist when one or more of its components is not of the proper proportion to sustain combustion.
B. The Hazards of Fire:	
Introduction:	Fire hazards can be defined as the dangers that exist in coming in contact with fire, or being in an environment which is created by a fire. These are two categories of fire hazards: 1. Physical hazards 2. Health hazards
Transparency 1-3 1. Physical Hazards a. Damage to property b. Injury Teacher Note: Give student the list from the lesson script and discuss injury or disease which might occur from either a or b.	Physical Hazards are further broken down into two types: a. Damage to property b. Injury (1) pain (2) blistering or charring of flesh (3) possible disfigurement (4) possible crippling (5) blindness from heat or light of fire (6) scorching of lungs and air passages (7) asphyxiation
Transparency 1-4 2. Health Hazards Teacher Note; Give student the list from the lesson script and discuss injury or disease which might occur or develop from either a or b.	The Health Hazards are: A. Oxygen deficiency B. Toxic fumes, vapors, mists, gasses, which are created from increased heating of chemicals, liquids, and metals.

Lesson Outline	Lesson Script
C. Sources of Fire and Preventative Measures	
Introduction:	To eliminate unwanted fires it is important to know how and where fires start and how to prevent them. A 10 year study on the sources of unwanted fires and how to prevent them was recently conducted by the Factory Mutual Engineering Corporation. They listed sixteen sources that were responsible for 99% of fires. The other 1% was listed under unusual or unimportant sources. These are the sixteen sources and their preventative measures.
Transparency 1-5 1. Electrical (23%)	The leading cause of unwanted fires. Most start in electrical motors and wiring. Prevented by proper maintenance and use.
Transparency 1-6 2. Smoking (18%)	A potential cause of fire almost everywhere. Prevented by education and control. (NO smoking areas and designated smoking areas).
Transparency 1-7 3. Friction (10%)	Hot bearings, misaligned or broken machine parts, choking or jamming of material and poor adjustment of machinery all cause friction heat to be produced. Prevented by inspection, maintenance, and oiling or greasing.
Transparency 1-8 4. Overheated Materials (8%) Teacher Note: Remark at this point that the first four sources of fires are responsible for 59% of fires, 1/4 of sources cause well over 1/2.	Caused by abnormal process temperatures such as those involving flammable liquids and materials in dryers, etc. Prevented by temperature controls, and well-trained operators and supervisors.

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Lesson Outline	Lesson Script
Transparency 1-9 5. Hot Surfaces (7%)	Normal heat from surfaces of boilers, furnaces, electric lamps, irons, ovens, etc., igniting flammable solids and liquids. Prevented by proper storage of flammable materials, and ample clearance between flammable materials and hot surfaces.
6. Burner Flames (7%)	Improper use of ovens, furnace boilers, torches, heating units, and etc. that have exposed flames. Prevented by ventilation, design, and by keeping combustible material away from the flames.
7. Combustion Sparks (5%)	Sparks and glowing embers released from incinerators, fire boxes, and industrial trucks. The incomplete burning of fuels. Prevented by well designed equipment and spark arrestors.
8. Spontaneous Ingnition (4%)	Fire in oily waste and rubbish, and in materials subject to heating. Prevented by good housekeeping. Remove waste daily and isolate storage subject to spontaneous heating.
9. Cutting and Welding (4%)	Sparks, arcs and hot metal from welding operation. Prevented by the use of the licensing of qualified welders and the Permit System.

Lesson Outline	Lesson Script
10. Exposure (3%)	Fires communicating from adjacent properties. Prevented by space, walls, or water screens.
11. Incendiarism (3%)	Also called arson. Fires set on purpose by owners, employees, intruders. Prevented by watch and guard service, and isolation.
12. Mechanical Sparks (2%)	Sparks caused by ferrous materials being struck such as hammering operations and foreign material (metal) in machines. Prevented by keeping stock clean and removing foreign matter by magnet or other separating methods.
13. Molten Substances (2%)	Caused by spills of molten metals, glass, etc. escaping from fractured furnaces or spilled during handling. Prevented by proper operation, handling, and isolation from each other, heat, electrical shock and jarring.
14. Chemical Action (1%)	Chemical processes getting out of control. Reacting with each other or decomposing creating high heat and fire. Prevented by proper operation, handling, and isolation from each other, heat, electrical shock and jarring.
15. Static Sparks (1%)	Ignition of flammable vapors, dusts, fibers, and gasses by the arcing of accumulated static electricity from machinery materials or the human body. Prevented by grounding, bonding, and the humidification of air.
16. Lightning (1%)	Direct lightning strokes, arcing from one object to another, and high current being induced into electrical circuits. Prevented by lightning rods, grounding, arrestors, and surge devices.

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Block #1 Lesson Plan #1 Page #1

Examination

This is a multiple choice examination. Place the letter designator for the most correct answer in the space provided to the left of the question.

___ 1. In scientific terms a fire is defined as:
  a. heat
  b. oxygen and fuel
  c. the rapid oxidation of matter
  d. the slow oxidation of matter

___ 2. The three components of a common fire are:
  a oxygen, fuel, heat
  b. oxygen, fuel, hydrogen
  c. liquid, solid, gas
  d. light, fuel, heat

___ 3. How long will a fire burn?
  a. Until the fuel is used up
  b. Until the fire department arrives
  c. Until you throw water on it
  d. So long as oxygen, fuel, and heat are present in the proper proportion.

___ 4. The two categories of fire hazards are:
  a. Oxygen deficiency and toxic fumes
  b. Toxic fumes and physical
  c. Physical and health
  d. Health and crippling

___ 5. Which of the following would not be considered a health hazard?
  a. Toxic fumes
  b. Gases
  c. Vapors
  d. Property damage

___ 6. These are the four most frequent causes of fire:
  a. Electrical, hot surfaces, welding, friction
  b. Smoking, lightning, spontaneous ignition, electrical
  c. Electrical, smoking, friction, overheated materials
  d. Burner flames, welding, lightning, exposure

Examination

___ 7. Which of the following would you as a worker have the most control over?
   a. Engineering
   b. Housekeeping
   c. Operating methods
   d. Type of material

___ 8. To prevent fire from excessive friction you as a worker would:
   a. re-engineer
   b. change operating methods
   c. oil and grease properly
   d. change the type of material being processed

___ 9. Fire caused by smoking, a potential cause of fire everywhere can be stopped or reduced by:
   a. Well designed equipment
   b. control and education
   c. spark arrestors
   d. ventilation

___10. Most fires are caused by which source?
   a. Friction
   b. electrical
   c. hot surfaces
   d. smoking

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Examination Key

C 1.

A 2.

D 3.

C 4.

D 5.

C 6.

B 7.

C 8.

B 9.

B 10.

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Block #1 Lesson Plan #2 Page #1

Lesson Title: Recognition of Classes of Fire - Controlling Fire Extinguishing Fire - Steps to Take When You Discover A Fire Transparency 1-10

Clock Hours: 90 minutes

Show Transparency #1

Terminal Objectives: At the conclusion of this lesson the students will be able to identify the four major classifications of fire, select the proper control method and extinguishing agent(s) for each classification, and will show their ability to do so by actually demonstrating without error the steps to take when you discover a fire and by completing with 100% accuracy a 15 question multiple choice examination on the subject.

Teaching Materials:

1. This lesson plan
2. Overhead projector
3. Transparency pack #1-2 (included)
4. Block #1 Lesson Plan #2 Examination (included)
5. Block #1 Lesson Plan #2 Examination Key (included)
6. Student Learning Experiences (included)
   (Note: To be correlated with lesson plan)

References: Strasser, Aaron, Bohn, Eales - Fundamentals of Safety Education, Macmillan, N.Y. 1965, pp. 332-360

Accident Prevention Manual for Industrial Operations National Safety Council, Chicago 1972, pp. 1076-1111.

Federal Register, Occupational Safety and Health Standards, 1910. 157 -- 1910. 162.

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Block #1 Lesson Plan #2 Page #2

Lesson Outline	Lesson Script
Introduction:	In our lesson covering what a fire is we learned that in order for a fire to exist there must be three components in the proper quantities present. 1. Oxygen 2. Heat 3. Fuel We are now ready to use this knowledge as a basis to help us in identifying classifications of fire, and selecting proper control methods and extinguishing agents.
A. Classifications of Fires: Transparency 1-11 1. Class A (Ordinary Solids)	There are four general classifications of fires. (Class A, B, C, and D). Class A fires are those fires which occur in ordinary solids such as wood, paper, cloth, rubbish, etc.
Transparency 1-12 2. Class B (Liquids)	Class B fires are those fires which occur in the vapor-air mixture above the surface of flammable liquids such as gasoline, solvents, thinners, liquid fuels, and paint.
Transparency 1-13 3. Class C (Electrical)	Class C fires are those that occur in or near electrical equipment.
Transparency 1-14 4. Class D. (Metals, Reactive Chemicals)	Class D fires are those which occur in inorganic matter such as the combustible metals -- magnesium, titanium, sodium, lithium and zirconium -- and certain reactive chemicals.

Lesson Outline	Lesson Script
Transparency 1-15 B. Fire Control Methods	Knowledge of what fire is, forms the basis for the study of fire control methods. Since we know that there must be three components present in the proper quantity for fire to exist, it should be evident that by removing or limiting any of the components we are able to control fire. There are four methods used to accomplish fire control. 1. Cooling 2. Removing Fuel 3. Removing Oxygen 4. Inhibiting the Reaction
Transparency 1-16 1. Cooling	Cooling:in order to extinguish a fire by cooling it is necessary to reduce the heat of the fire to some temperature below the flash point. The flash point is the lowest temperature at which a material gives off enough gasses to form an ignitable mixture with air and produce flame when a source of ignition is present.
Transparency 1-17 Removing Fuel	Removing the fuel from an existing fire is usually a dangerous process, although, it is used as a method of controlling fire. Forest fire fighters use it when they remove the fuel from an area around a fire -- called a fire break. This way the fire is extinguished when the available fuel is used up. Shut off valves in gas or liquid lines accomplish the same purpose.
Transparency 1-18 Removing Oxygen	Once again we call upon our knowledge of the chemistry of fire for our third method of fire control. Limit or shut-off the oxygen supply. This is usually accomplished by blanketing the area above the fire with nonflammable material which will prevent the flammable gasses and oxygen from uniting in a flammable mixture. Up to this point we have discussed fire and fire control from the standpoint of the basic fire triangle:

Lesson Outline	Lesson Script
4. Inhibiting the Reaction Show Transparency 1-19	Up to this point we have discussed fire and fire control from the standpoint of the basic fire triangle: Oxygen + Heat + Fuel = Fire The above formula is often referred to as the fire triangle. In the past since it was recognized that there were only three components of a fire, it was assumed that there were only three methods that would control the fire: 1. Removal of heat (cooling) 2. Removal of oxygen 3. Removal of fuel Recent studies however, have shown that the chemical reaction which takes place in a fire is more complex than the basic formula In fact several reactions take place during the course of a fire which produce combustible gasses. Experimentation has shown that it is possible to introduce certain substances into an existing fire which will more readily unite with gasses than oxygen does, and that the resultant substance is nonflammable. This process serves the same purpose as removing the fuel supply, oxygen supply, or reducing the heat (coolin
Show Transparency 1-20 C. Extinguishing Agents: (Teacher note: Around most schools you will find several fire extinguishers. A display of these to be referred to during the lesson would add interest).	There are numerous agents used for the purpo of extinguishing fires and there are two primary systems. The two primary systems a fixed and portable. Since fixed systems are installed and usually work automatically or are actuated by trained personnel we will concentrate our studies in the area of portable fire extinguishing agents. In the cour of your work you are likely to discover a fire and you will have to use your knowledge of the chemistry of fire to extinguish it. This will require the selection of the prop fire extinguishing agent for the type of fi

Lesson Outline	Lesson Script
1. Pump Type	This is a tank of water which has a pump handle at the top. It is used to extinguish class A fires only.
2. Soda Acid	When this tank is turned upside down a solution of baking soda and water mixes with acid and creates a foam-like substance which cools and smothers fires. It should only be used on class A fires.
3. Dry Chemical	Used on class A, B, and C fires -- is highly effective and non-conducting (inhibits reaction).
4. Carbon Dioxide (CO2)	Primarily for use on class B and C fires, but may be used on small class A fires. Replaces oxygen in the area of the fire and cools below ignition point.
5. Foam	Used on class B fires -- expels thick foam. Operates on inversion like the soda acid type. Spreads over the surface of burning liquids and inhibits oxygen.
D. Steps to take when you discover a fire.	
Introduction	Although those who understand fire hazards conscientiously attempt to eliminate or compensate for them can minimize the possibility of fire, they cannot eliminate it. They cannot prevent fires caused by lightning, arson, and the carelessness of others, and once in a while a useful fire gets out of control despite all precautions. A fire safety program, therefore, must cover not only preventative measures but must include steps to take when you discover a fire.
Step #1 Sound the Alarm	Each year, many fires discovered in their early stages become uncontrollable because of the failure of the individual who discovered it to turn in a prompt alarm; usually because he attempted to extinguish it by himself and it got out of control.

Lesson Outline	Lesson Script
Step #2 Check the extent of the fire to see if you are capable of extinguishing it.	This can be vitally important, for fire fighting efforts during the first five minutes of a fire are worth more than the work of the next five hours.
Step #3 Selecting the proper extinguisher	Decide from your knowledge of fire the class of fire you will be fighting, then choose the proper extinguishing agent. Remember the wrong type of extinguishing agent on a fire could spread it or injure you.
Step #4 Attempt to extinguish fire	Before starting, plan your escape route in case the fire should spread--always have an out. Each type of fire extinguisher has a specific method of putting it into operation and a specific method of use. These are the operating instructions and methods of use for the types of extinguishers covered in this lesson plan.
A. Operation and Use of Pump-type extinguisher	Operation - place foot on foot bracket and operate pump with 6 to 8 inch strokes. Use - direct the stream of water at the base of the fire and then follow the flames up while moving stream from side to side or around fire.
B. Operation and use of Soda Acid extinguisher	Operation - Invert extinguisher, hold by bottom handle Use - Direct stream at base of fire - follow up after flames while moving from side to side or around if possible.
C. Operation and use of Dry Chemical extinguisher	Operation - Remove nozzle from holster and press puncturing lever (if locking pin is present ring must be pulled out). Use - Direct spray into the flame itself with a fanning motion - allow spray to fall into the fire.

Lesson Outline	Lesson Script
D. Operation and use of Carbon Dioxide Extinguisher	Operation - Hold in upright position pull locking ring pin - squeeze the discharge lever. Use - Direct the spray at base of flame-use fanning motion - start at near edge and work to rear.
E Operation and use of Foam Type Extinguisher	Operation - Invert the cylinder hold by bottom handle Use - For liquid (Class B) fires direct the stream in an arc and let it fall against the back of the container or into the fire. For class A fires aim at base of fire working from side to side.
Student learning experiences	The following learning experiences should accompany the lesson plan and be synchronized with it. The accomplishment of each of the experiences should be arranged by individual students or groups of students. This will give the students the opportunity to apply and extend their knowledge of fire prevention and extinguishment, and will give the teacher a basis upon which to estimate the extent of their learning.
1. Demonstration of Spontaneous Combustion	With the assistance of the chemistry or general science teacher arrange a demonstration of spontaneous combustion and report to the class steps that you would use to prevent it at home, at work, or at school.
2. Collection and Evaluation of Fire Date	Collect newspaper, radio, and television data on fires for a one week period. List the causes and consequences of the fires. List the steps that might have been effective in preventing them. Make report to class.
3. Demonstration of Effect of Electrical Overloading	With the aid of the general science teacher or electrical shop teacher arrange for a demonstration of the effect of overloading an electrical circuit. Report to class on methods to use in preventing overloading.

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Block #1 Lesson Plan #2 Page #8

Lesson Outline	Lesson Script
4. Lecture on Fire Prevention	Arrange with the local fire department for a representative to talk before an assembly or the class on Fire Prevention
5. Checklist Development	Develop a checklist which can be used to prevent fires at home, at work, at school. List existing hazards, what can be done to remove them or to prevent them from causing fires.

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Block #1 Lesson Plan #2 Page #1

Examination

This is a multiple choice examination. Choose the best answer from the four possible and place the letter designator for that answer in the space provided at the left of the question.

_____ 1. How may general classifications of fire are there:
   a. one
   b. two
   c. three
   d. four

_____ 2. The classification of an electrical fire is:
   a. Class A
   b. Class B
   c. Class C
   d. Class D

_____ 3. The classification of fire in paper, wood or cloth is:
   a. Class A
   b. Class B
   c. Class C
   d. Class D

_____ 4. Flammable liquid fires are:
   a. Class A
   b. Class B
   c. Class C
   d. Class D

_____ 5. Which of the following fire control methods is the most dangerous.
   a. Cooling
   b. Removing fuel
   c. Removing or replacing oxygen
   d. Inhibiting the reaction

_____ 6. A stream of water would not be used to extinguish a fire in:
   a. rags
   b. wood
   c. trash
   d. oil

Examination

___7. Carbon Dioxide is not very effective against:
  a. electrical fires
  b. small trash fires
  c. large trash fires
  d. flammable liquid fires

___8. Interrupting the chemical reaction of a fire is accomplished by:
  a. cooling
  b. removing the fuel
  c. removing the oxygen
  d. introducing another ingredient

___9. The newest method of controlling fire is called:
  a. cooling
  b. removing fuel
  c. removing oxygen
  d. Inhibiting the reaction

__10. The type of extinguishing agent which is highly effective against Class A, B, and C fires is:
  a. water
  b. carbon dioxide
  c. soda acid
  d. dry chemical

__11. The time when a fire can best be controlled is:
  a. during the first five minutes
  b. during the first five hours
  c. while the fire department is present
  d. before the alarm is given.

__12. Each year, many fires discovered in their early stages become uncontrollable because of:
  a. Failure to remove flammables
  b. Failure to give alarm
  c. Failure to attempt to extinguish it
  d. Failure to notify supervisors

Examination

___ 13. The last of the four major steps to take when you discover a fire is to:
- a. Check the extent of the fire
- b. sound the alarm
- c. attempt to extinguish it
- d. select the proper extinguishing agent

___ 14. The two types of extinguishers discussed which must be inverted to operate are:
- a. soda acid and foam
- b. foam and dry chemical
- c. dry chemical and carbon dioxide
- d. pump type (water) and soda acid

___ 15. The type of extinguishing agent which must be sprayed into the flame itself and allowed to fall into the fire is:
- a. Soda Acid
- b. Foam
- c. Dry Chemical
- d. Carbon Dioxide

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Block #1 Lesson Plan #2 Page #1

Examination Key

d 1.
c 2.
a 3.
b 4.
b 5.
d 6.
c 7.
d 8.
d 9.
d 10.
a 11.
b 12.
c 13.
a 14.
c 15.

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Block #2 Lesson Plan #1 Page #1

Lesson Title: Manual Handling of Material Title Transparency 2-1

Clock Hours: 60 minutes

Show Transparency #1

Terminal Objectives: After participating in this lesson the students will demonstrate their knowledge of the manual handling of materials completing with 100% accuracy a ten question multiple choice examination on the lesson matter.

Teaching Materials:

1. This lesson plan
2. Overhead Projector
3. Blackboard
4. Transparency Pack #2-1
   Plan #1.
5. Examination
6. Examination Key

References:

Suggested Lesson Plans in Safety Education, National Association of Distributive Education Teachers, 1962-1963 Project.

Strasser, Aaron, Bohn, Eales, Fundamentals of Safety Education, Macmillan, N.Y. 1964, pp. 272-286.

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Block #2 Lesson Plan #1 Page #2

Lesson Outline	Lesson Script
A Manual Handling of Materials Introduction? Teacher Note: Prepare three boxes of different weights and same size - Have student demonstrate proper methods of lifting. Each student should participate.	The three most common causes of accidents to young people in industry are: 1. Muscular strain and physical over-exertion 2. Pinching or smashing of toes and fingers. 3. Horseplay
1. Muscular strain and physical over exertion.	Muscular strain and physical over exertion are caused by improper lifting and handling procedures.
Show transparency #2-2 Injuries	Improper lifting procedures can cause serious and painful injuries such as: 1. Slipped spinal disc--painful and crippling. 2. Pulled and strained muscles and leaders. 3. Hernia 4. Ruptures 5. etc.
2. The Pinching or smashing of toes and fingers. Show transparency #2-3	The pinching or smashing of toes and fingers is not only painful and sometimes crippling, but usually results in the temporary inability to produce. Employers do not continue to employ habitually careless people or those who can not produce to make a profit.
3. Horseplay Show transparency #2-4	Playing games, pushing, shoving others, throwing or pulling practical jokes on others is the one greatest cause of accidents among young people in business and industry. It not only can but does result in injury to personnel and damage to equipment.
	Most accidents can be prevented by using proper handling methods. These methods are: 1. Proper lifting method 2. Proper method for moving material at arm level 3. Proper method for moving material at higher than head level. 4. Proper method for using simple hand tools.

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Block #2 Lesson Plan #1 Page #3

Lesson Outline	Lesson Script
1. Proper Lifting Method Show transparency #2-5	a. Always test the weight of item to be lifted. If too heavy get help or use a lifting device. b. Be sure you have good footing. c. Squat with knees straight in front and slightly apart, back straight, and arms extended. Lift with legs.
2. Proper method for moving material at arm level. Show transparency #2-6	a. Test weight of material. b. Lift side of material toward you. c. Slide to edge of support. d. Hug load to you keeping back straight. Let your legs support the weight.
3. Proper method for moving material at higher than head level. Show transparency #2-7 Show transparency #2-8	a. Always use assistance of another person regardless of weight involved. b. Use special handling equipment for heavy material. c. Use ladders with care. (1) never carry up and down ladders. (2) hand boxes to person on floor.
4. Proper method for using simple hand tools. Show transparency #2-9 Show transparency #2-10	a. Opening paper cartons. (1) Use proper tool for cutting. Never use double edge razor. (2) Cut with slow firm stroke keeping other hand clear. b. Opening wooden boxes and crates. (1) Use proper tools for prying. Pry bars, crow bars, etc. are designed for this purpose. Do not use screwdrivers or tools designed for other purposes. (2) Cut wire with wire cutters. (3) Remove nails with claw hammer or mechanical nail puller. (4) Use extreme care in handling boxes and boxing material as injury may be caused by splinters, loose wires, nails, or other projecting objects.

OCCUPATIONAL SAFETY AND HEALTH
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Block #2 Lesson Plan #1 Page #1

Examination

This is a multiple choice examination. Place the letter designator for the most correct answers in the blank provided at the left of the question.

_____ 1. Of the following, which is not one of the three most common causes of accidents to young people in industry?
   a. Muscular strain and physical exertion
   b. Pinching or smashing of toes and fingers.
   c. Operation of material handling equipment
   d. Horseplay

_____ 2. Lifting should be done with:
   a. The legs
   b. The arms
   c The back
   d. The neck

_____ 3. If the load is too heavy to lift you should:
   a. Rock backwards
   b. Jerk upwards quickly
   c. Lift one side before the other
   d. Get help or use a lifting device

_____ 4. In handling material you should never:
   a. use assistance of another person
   b. use lifting devices
   c. carry up or down a ladder
   d. test weight

_____ 5. When lifting from above ground level the weight should be directed:
   a. Toward you
   b. away from you
   c. up
   d. down

_____ 6. The proper tool for removing the nailed down lid of a wooden box is:
   a. Pliers
   b. Screwdrivers
   c. Hammer
   d. Pry bar

Examination

_____ 7. The following tool is never to be used opening cardboard containers.
- a. Razor Knife
- b. Hawkbill Knife
- c. Box Cutter
- d. Double edge razor blade

_____ 8. When handling material at over the head height you should always:
- a. Lift with your back
- b. Use a ladder
- c. Use assistance of another person
- d. Test the weight to see if you can handle it by yourself.

_____ 9. The one action which covers the most injuries to young people in industry is:
- a. Improper lifting procedures
- b. Improper use of hand tools
- c. Improper handling methods
- d. Horseplay

_____10. Before squatting to lift you should first:
- a. Use special handling equipment
- b. Let your legs support the weight
- c. Be sure you have good footing
- d. Use proper hand tools

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Block #2 Lesson Plan #1 Page #1

Examination Key

c 1.
a 2.
d 3.
c 4.
b 5.
d 6.
d 7.
c 8.
d 9.
c 10.

OCCUPATIONAL SAFETY AND HEALTH
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Block #2 Lesson Plan #2 Page #1

Lesson Title : Machine handling of materials. Title transparency 2-11

Clock Hours: 90 minutes

Terminal Objectives: At the conclusion of this lesson the students will know how to safely use hand material handling equipment, and know the general rules for using all types of powered material handling equipment. They will demonstrate their knowledge by completing examination on the subject.

Teaching Materials:
1. This lesson plan
2. Overhead projector
3. Transparency pack #2-2
4. Block #2 Lesson Plan #2 Examination
5. Block #2 Lesson Plan #2 Examination Key
6. Collection of hand material handling equipment

References: Blake, Roland P. Industrial Safety, Prentiss-Hall, N.J. 1963, pp. 151-161.

Occupational Safety and Health Standards. Federal Register, D.C., 1910. 178 through 1910.181.

Eninger, M.U. Accident Fundamentals. Armco Steel Corporation 1963, Chapter 12, pp. 17-21

OCCUPATIONAL SAFETY AND HEALTH
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Block #2 Lesson Plan #2 Page #2

Lesson Outline	Lesson Script
Machine Handling of Material	
Definition:	Has one or more moving parts and any device which is used to make the handling of material easier and safer for the worker is classed as a machine.
	The machine or equipment which is used in material handling is broken down into two categories: Transparency 2-12 1. Hand equipment 2. Powered Equipment
1. Hand Equipment Teacher note: A display of the types of hand equipment discussed in this lesson plan should be made during this presentation. Most if not all are available in most schools or school systems. Check with maintenance personnel and shop teachers. At conclusion of lesson have suudents inspect and operate each piece of equipment.	Any material handling equipment that replaces direct hand lifting and carrying is a step in the direction of safety. Such equipment, however, is not without its own characteristic hazards. These must be made a matter of knowledge to the user and must be understood by them. The five most commonly used pieces of hand equipment are: a. wheelbarrows b. two wheel handtrucks c. four wheel handtrucks d. dollies e. jacks.

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Block #2 Lesson Plan #2 Page #3

Lesson Outline	Lesson Script

a. Rules for safe operation of wheelbarrows.	Transparency 2-13
	(1) If more than one type is available, select the one best suited for the work to be done.
	(2) Check its condition for safe operation
	    (a) handles not cracked
	    (b) bolts secure
	    (c) tires inflated properly
	    (d) handguards in place
	(3) Place weight of load over wheel
	(4) Use two steps for starting to move
	    (a) lift slowly to balance point
	    (b) accelerate slowly
	(5) Walk do not run
	(6) Check path for obstacles
	(7) Drop it if it gets out of control (better a spilled load than a sprained back)

b. Rules for safe operation of two wheel hand trucks.	Transparency 2-14 (1) There are many special purpose types. Some, for example, designed for kegs, drums, and barrels. Select the correct type for the material to be hauled. (2) Check for defects (3) Keep center of gravity low as possible (place heavy items on bottom) (4) Don't overload (5) Balance load laterally (6) Secure the load (7) Push - except uphill (8) Walk, don't run
c. Rules for safe operation of four wheel handtrucks.	Transparency 2-15 (1) Check for defects (2) Block wheels when loading (3) Balance the load (4) Keep load below eye level or use another worker as a safety guide (5) Push-unless pull handle is provided (6) When parked insure that pull handle is locked in up position

Lesson Outline	Lesson Script
d. Rules for safe operation of dollies.	Transparency 2-16 A dollie is a small platform on low coaster wheels which will turn 360° in one spot. It is used mostly for carrying heavy single objects for short distances over a level path, and for moving objects that are too heavy to lift to the bed of a truck. (1) check for defects (2) move and guide by pushing (3) if item is bulky and heavy use second man for better control
e. Rules for safe operation of jacks	Transparency 2-17 (1) Select a jack that has a capacity as great or greater than the load (2) Check for defects (3) Set on level base (level by blocking underneath) (4) Use wooden shim between jack head and load (5) Never jack at an angle (6) Operate jacking handle from the side (7) Operate slowly checking to see that load is secure (8) Block load when lifted, don't depend on jack to hold load up (9) Never work under an unblocked load
2. Powered Equipment Teacher Note: A visit to a construction site, material storage facility should be made. Students should observe safe operation of equipment and if possible inspect safe maintenance.	It is beyond the scope of this lesson plan to cover all of the different types of powered material handling equipment and the thousands most powered equipment will fall under the following categories and there are some general rules which apply to all.
a. General Categories of Powered Material Handling Equipment	1. Cranes 2. Hoists 3. Conveyors 4. Power Trucks 5. Tractors 6. Elevators 7. Railroad Engines 8. Lifts

Lesson Outline	Lesson Script
b. General rules for the safe operation of powered material handling equipment.	The following rules for the safe operation and use of powered material handling equipment would have equal importance for the use of all machinery. If these rules are followed, accidents and injuries caused by the operation and use of machinery can be reduced or eliminated. (1) Before operating equipment perform walk around inspection. (a) check oil and grease (b) check all friction points for signs of wear (c) check all tension devises (ropes, cables, etc.) for fraying, kinks, or bends (d) check all pressure points for cracks or chipping (2) Make sure equipment is in proper working order before using. (3) Do not use broken, excessively worn, or improperly operating equipment. (4) Know the limitations of the equipment. (5) Remove all foreign matter from the equipment before operating. (6) Never operate equipment unless authorized and thoroughly instructed in its use. (7) Never misuse or mishandle equipment. (8) Never permit an unauthorized person to use the equipment.

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Block #2 Lesson Plan #2 Page #1

Examination

This is a multiple choice examination. Place the letter designator for the correct answer in the left of the question number.

_____ 1. The two categories of material handling equipment are:

a. Hand equipment and dollies
b. Trucks and powered equipment
c. Trucks and dollies
d. Hand equipment and powered equipment

_____ 2. The following are examples of hand material handling equipment.

a. Dollies, jacks, wheelbarrows
b. Hand Trucks, fork lifts, elevators
c. Wheelbarrows, fork lifts, hoists
d. Hoists, cranes, tractors

_____ 3. Two wheel or four wheel hand trucks should always be pushed except when:

a. going uphill
b. going downhill
c. having load above eye level
d. empty

_____ 4. The piece of equipment used to transport heavy material on a level surface and that will turn 360° in one spot is a:

a. Tractor
b. Hand truck
c. Dollie
d. Wheelbarrow

_____ 5. When using a two wheel hand truck, the center of gravity should be:

a. low
b. high
c. in the center
d. its unimportant

Examination

______6. If more extension is needed for a jack you should:

a. Buy a longer extension
b. Place a shim between the jack head and load
c. Place blocks under the jack
d. Add more hydraulic fluid

_____ 7. A jack should never be:

a. Placed in a vertical position
b. Placed at an angle
c. Placed in a horizontal position
d. Placed on wooden support blocks

_____ 8. When operating a jack handle you should always stand:

a. Above the jack
b. Straddle of the handle
c. To the side of the handle
d. Below the jack head

_____ 9. Due to the fact that its casters move in all directions, this piece of equipment should never be pulled by a rope:

a. Dollie
b. Hand truck
c. Four wheel cart
d. Crane

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Block #2 Lesson Plan #2 Page #1

Examination Key

d 1.

a 2.

b 3.

c 4.

a 5.

c 6.

b 7.

c 8.

a 9.

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Block #2 Lesson Plan #3 Page #1

Lesson Title: Handling of Hazardous Materials
Title Transparency 2-18

Clock Hours: 60 minutes

Show Transparency #1

Terminal Objectives: At the conclusion of this lesson plan the students will know the major types of hazardous materials, the methods of identifying hazardous materials, and the effects of exposure to hazardous materials; and will demonstrate their knowledge by completing with 100% accuracy a ten question multiple choice examination on the subject.

Teaching Materials:

1. This lesson plan
2. Overhead projector
3. Transparency Pack #2-3
4. Examination
5. Examination Key

References:

Occupational Safety and Health Administration Instructor Manual OSHA-2073, A Guide to Voluntary Compliance. pp. 6-1 to 7-1 and 13-1 to 14-1.

Blake, Roland P. Industrial Safety, Prentise Hall N.J. 1963 pp. 298-320.

Federal Register, Occupational Safety and Health Standards, 29CFR 1910 sub parts G,J,K.

OCCUPATIONAL SAFETY AND HEALTH
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Block #2 Lesson Plan #3 Page #2

Lesson Outline	Lesson Script
Definition of Hazardous Materials	Any substance that might in any way cause injury to or impare the health of an employee.
Types of Hazardous Materials	1. Air contaminating materials. a. Dust b. Fumes c. Mists d. Vapor 2. Flammable Materials 3. Radio Active Materials 4. Explosive Materials
Handling of Hazardous Materials	1. Before handling materials read markings or labels to learn contents. 2. All hazardous materials require special handling. Check with your supervisor for advice and directions.
Show Transparency #2-19	3. All materials that present a radiation hazard should be marked with the standard radiation warning sign.
Show Transparency #2-20	4. Hazardous materials are normally labeled or tagged. These labels or tags are color coded. 1. Red is for flammable material or extremely dangerous situations. 2. Orange is for dangerous areas or energized equipment. 3. Yellow is for caution and marks physical hazards. 4. Green designates safety and first aid equipment. 5. Blue designates caution limited to warning against equipment being repaired. 6. Purple designates radiation hazard.

Lesson Outline	Lesson Script
Show Transparency #2-21	1. Air contaminates
Effects of exposure to hazardous materials. (coal, dust, silica, & etc.)	a. Pneumoconiosis - coats the lungs and interferes with breathing may result in cancer.
(Toxic materials entering mouth and nose)	b. Poisoning
(Contact of skin with organic dusts)	c. Skin irritations and allergic reactions.
(Anthrax from furs or skin)	d. Bacterial and fungi infections.
(Caused by breathing mists or fumes of acids or alkalies)	e. Nose and throat irritations.
(Chief cause asbestos dust)	f. Cancer

OCCUPATIONAL SAFETY AND HEALTH
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Block #2 Lesson Plan #3 Page #1

Examination

This is a multiple choice examination. Place the letter designator for the correct answer in the space at the left of the question.

_____ 1. Dusts, fumes, mists, vapors are examples of:
   a. Flammable materials
   b. Air contaminating materials
   c. Water pollutants
   d. Radio active materials

____ 2. "Any substance that might in any way cause injury to or impare the health of an employee," is the definition of:
   a. Air contaminants
   b. Hazardous materials
   c. Radio active materials
   d. Biological hazards

_____ 3. Which of the following is a correct statement?
   a. Only certain hazardous materials require special handling.
   b. Hazardous materials are handled the same as other materials.
   c. Radioactive materials are only dangerous if contacted.
   d. All hazardous materials require special handling.

_____ 4. The color designator for radiation is:
   a. purple
   b. red
   c. green
   d. blue

_____ 5. A purple sign with a yellow background designates:
   a. explosive hazard
   b. air contaminates
   c. radiation hazard
   d. water hazard

_____ 6. The color which designates extreme danger or fire equipment is:
   a. purple
   b. red
   c. green
   d. blue

Examination

_____ 7. The color which denotes caution and marks physical hazards is:
a. purple
b. red
c. orange
d. yellow

_____ 8. Pneumoconiosis interferes with breathing, coats the lungs, and is caused by:
a. organic dusts
b. coal dust & silica
c. poisoning
d. asbestos dust

_____ 9. Contact of skin with organic dusts causes:
a. bacterial and fungi infection
b. cancer
c. poisoning
d. skin irritation

_____10. Nose and throat blistering is normally caused by breathing:
a. coal dust and silica
b. organic dusts
c. mists from acids and alkalies.
d. inorganic dusts

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Block #2 Lesson Plan #3 Page #1

Examination Key

_b_ 1.

_b_ 2.

_d_ 3

_a_ 4.

_c_ 5.

_b_ 6

_d_ 7.

_b_ 8

_d_ 9.

_c_ 10.

OCCUPATIONAL SAFETY AND HEALTH
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Block #3 Lesson Plan #1 Page #1

Lesson Title: Personal Protective Equipment Title Transparency 3-1

Clock Hours: 150 minutes

Show Transparency #1

Terminal Objectives: At the conclusion of this lesson the student will have a working knowledge of personal protective equipment types, and their use; and will demonstrate this knowledge by completing with 100% accuracy a 10 question multiple choice examination on the subject.

Teaching Materials:

1 This lesson plan
2. Overhead projector
3. Transparency Pack #3-1
4. Blackboard
5. Examples of Equipment

References: Accident Prevention Manual for Industrial Operation, National Safety Council, Chicago 1972, pp. 1142-1204.

A Guide To Voluntary Compliance, U.S. Dept. of Labor, Instructors Manual OSHA-2073, pp. 5-1 to 5-16.

Blake, Roland P. Industrial Safety, Prentiss-Hall, N.J. 1963, pp. 320-349

Lesson Outline	Lesson Script
Personal Protective Equipment Teachers note: If possible, gather examples of each type of personal protective equipment covered in this lesson plan. Have students practice using them and adjusting them.	It falls directly upon the employer to furnish a safe work place for employees. While the above statement is true it does not follow that work will be accomplished in a safe manner. The safe accomplishment of w falls directly upon the employee and his adher hence to sound safety practices. Probably one of the most important practices that an employee can develop is that of selecting and using proper personal protective equipment.
	Although the Williams-Sleiger Occupational Safety and Health Act of 1970 requires employe to provide a safe work place for employees, it does not require them to furnish all items of personal protective equipment. In fact some businesses will require that you furnish some or all of your personal portective equipment.
	Whether your personal protective equipment is employer furnished or self furnished it is extremely important that it be of sufficient quality to accomplish its design functions.
	Knowledge of the types of personal protective equipment available and the use for which they are designed will assist you in making good purchases or in determining the adequacy of furnished equipment.

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Block #3 Lesson Plan #1 Page #3

Lesson Outline	Lesson Script
Types of Personal Protective Equipment	There are basically 7 types of personal protective equipment: 1. Head protectors 2. Ear protectors 3. Face and Eye protectors 4. Respiratory System Protectors 5. Hand, foot, and leg protectors 6. Protective clothing 7. Safety belts
1. Head Protectors Show Transparency #3-2	In general there are two names for head protectors, safety hats and safety helmets. For simplicity we will refer to them only as safety hats. Safety hats are of two general types
Types	1. brimless 2. full brimmed Each type is further broken down into four classes.
Classes	1. Class A--- general service - for protection against impact, and voltages up to 600 volts. 2. Class B--- Utility Service, for protection against impact and high voltage (up to 30,000 volts and 9 mil. amps). 3. Class C--- Special Service- light impact and no protection against electricity. Sometimes referred to as a bump helmet. 4. Class D--- Limited protectors- usually used by firefighters.
Safety caps Show Transparency #3-3	In addition to safety hats, hair protective devices are sometimes required to be worn by those people who have long hair. Caps have been specially designed for this purpose.

Lesson Outline	Lesson Script
Inspection	Safety hats should be inspected before each use for cracks, dents, and signs of wear which might reduce the degree of protection. Special attention should be given to the suspension because of the important part it plays in the absorption of shock.
2. Ear Protection	Increasing attention is being given to the problem of excessive noise in industry. It can cause loss of hearing and intense pain.
Types	Other than engineering or mechanical methods of reducing noise level, there are currently only two basic types of ear (hearing) protective equipment: 1. Insert Types (Ear Plugs) 2. Ear Muffs
Insert Types Show Transparency #3-4	The insert types, placed into the ear canal, offers ample protection against most noise when properly fitted and constructed of the proper material.
Muff (Cup) Type Show Transparency #3-5	Additional protection may be attained by the use of muffs.
	Note: In addition to the two basic types of ear protectors a protective helmet has been developed that shields the entire bony structure of the head from sound vibrations of very high intensity. (Bones conduct these vibrations to the inner ear).

Lesson Outline	Lesson Script
3. Face and Eye Protection	In general there are four types of face and eye protection: 1. Goggles 2. Spectacles 3. Shields 4. Hoods
Eye Protection	Spectacles may be worn for limited hazards involving only frontal protection. Even with side shields they provide only minimal side protection. Their lightness and neat appearance make them more acceptable where they afford adequate protection.
Goggles	Transparency 3-6 Goggles afford better protection than spectacles since they are designed to protect the eye from flying particles from all directions (above, below, side, and frontal).
Eye and Face Protection	Transparency 3-7 Shields and Hoods protect both the face and the eyes from flying particles and should always be used when injury to the face is possible.
Additional Advantage of Face and Eye Protection	Special colored glass or plastic may be used in all types of face and eye protection to filter out light rays or radiation which might be injurous to the eye. Special shields and helmets have been fabricated to protect the face and eyes from damage due to heat, or chemical exposure.
4. Respiratory System Protectors	There are literally hundreds of respiratory protective devices, and there is not time in this course to cover all devices so no attempt will be made to do so.

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Block #3 Lesson Plan #1 Page #6

Lesson Outline	Lesson Script
Two Types	In general, respiratory protective devices are designed either to purify the air being inhaled by removing the contaminates or to supply the user with clean air from an outside source.
Air purifying devices Show Transparency #3-8	The equipment that purifies the air is designated as air purifying. Examples: 1. Those that make use of mechanical filters for removing particulate matter such as dusts, fumes, and mists from the air. 2. Those that make use of chemical sorbents for removing gases and vapors from the air.
Air supplying devices Show Transparency #3-9 Remote Type	The equipment that supplies fresh air from an outside source is designated as air supplying. Example: 1. Types in which fresh air is brought to the user from a distant point through a hose or pipe.
Self Contained	2. Types in which compressed air or oxygen is supplied from a tank carried by the user.
Selection of Respiratory System Protectors	The following factors should be considered in choosing a respirator. 1. Nature of hazard 2. Severity of hazard 3. Type of contaminant 4. Concentration of contaminant 5. Period of time protection required 6. Distance from pure air source 7. Expected activity of user 8. Characteristic and limitations of the choice of respirators.

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Block #3 Lesson Plan #1 Page #7

Lesson Outline	Lesson Script
5. Hand, Foot and Leg Protectors	
Show Transparency #3-10	Although there are many ointments and creams on the market which are reputed to furnish protection to the hands they have not proven to be effective in most cases. Gloves are the best personal protective device for the hands. They are manufactured to supply protection from many hazards such as heat, chemicals, sharp objects, acids, caustics, oils, solvents and friction. The choice of gloves depends upon the hazard and its intensity.
Feet and Legs	
Show Transparency #3-11	
Feet	The great majority of foot injuries is caused by dropping objects upon them. Steel toed safety shoes will protect against most foot injuries from this cause. The accepted standard for strength is that the toe box must withstand the impact of 50 lbs. dropped from 1 foot. For impacts greater than this special guards are required.
Legs	Protection for the legs depends upon the hazard to be guarded against. The device most commonly used is leggings ranging from waist length to those that reach only part way to the knee.
6. Protective Clothing Show Transparency #3-12	Industrial operations present such hazards as burns, abrasions, or skin irritation from chemicals or detergents. Protection from these hazards sometimes necessitates the wearing of protective clothing such as asbestos suits, rubber aprons, special coveralls. In selecting such clothing two rules must be followed.

Lesson Outline	Lesson Script
	1. The garment must give adequate protection from the hazard involved. 2. The garment must not interfere with the wearer's movements.
7. Safety Belts Show Transparency #3-13	The wearing of safety belts when working high above ground level is mandatory. The selection of a safety belt should be based on the following criteria: 1. Does it have sufficient strength to stop the wearer after a maximum free fall. 2. Will it absorb the shock without undue injury to the wearer. 3. Is the stopping distance short enough to prevent the wearer from striking some dangerous obstruction.

Examination

This is a multiple choice examination. Place the letter designator for the most correct answer or phrase in the space provided to the left of the question.

___ 1. The number of basic types of personal protective equipment is:
   a. 7
   b. 4
   c. 3
   d. 6

___ 2. The class of safety hat which furnishes protection against up to 30,000 volts of electricity is:
   a. class A
   b. class B
   c. class C
   d. class D

___ 3, The class of safety hat which furnishes protection against light impact only is:
   a. class A
   b. class B
   c. class C
   d. class D

___ 4. The insert type of ear protector must be:
   a. made of wax
   b. made of cotton
   c. fitted
   d. ventilated

___ 5. The best face and eye protector to use when welding is:
   a. goggles
   b. hood
   c. spectacles
   d. shield (hand type)

___ 6. The two general types of respiratory protective devices are:
   a. face mask and air purifying
   b. air purifying and air supplying
   c. hose type and remote
   d. self contained and air supplying

Examination

___ 7. The best protective device for hand is:
   a. gloves
   b. ointments
   c. creams
   d. none

___ 8. The accepted standard for strength of steel toed safety shoes is that they withstand the impact of:
   a. 100 lbs. dropped from 2 feet
   b. 100 lbs. dropped from 1 foot
   c. a thousand pound weight
   d. 50 lbs. dropped from 1 foot

___ 9. The device which is designed to protect the eye from flying particles from all directions is:
   a. spectacles
   b. hand shield
   c. goggles
   d. face mask

___10. Safety belts are to be worn at all times when:
   a. there is danger of a fall
   b. working on electrical circuits
   c. working above ground level and there is danger of a fall
   d. working on a slick surface

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Block #3 Lesson Plan #1 Page #1

Examination Key

a 1.

b 2.

c 3.

c 4.

b 5.

b 6.

a 7.

d 8.

c 9.

c 10.

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Block #3 Lesson Plan #2 Page #1

Lesson Title: Machine Guards Title Transparency 3-14

Clock Hours: 60 minutes

Show Transparency #1

Terminal Objectives: At the conclusion of this lesson the students will know the hazards of operating machinery and the importance of using guards to prevent injury; and will demonstrate their knowledge by completing with 100% accuracy a 10 question multiple choice examination on the subject.

Teaching Materials:

1. This lesson plan
2. Overhead projector
3. Transparency Pack #3-2
4. Examination for Lesson Plan #1 Block #3
5. Examination Key for Lesson Plan #1 Block #3

References: A guide to Voluntary Compliance, U.S. Dept. of Labor, Occupational Safety and Health Administration, Instructors Manual, pp. 15-1 to 16-1.

Blake, Roland.P. Industrial Safety, Prentiss Hall, N.J. 1963, pp. 175-211.

Federal Register, Occupational Safety and Health Standards, 29CFR 1910 Subpart O.

Lesson Outline	Lesson Script
A. Critical Hazards Show Transparency #3-15	The machine operator should be aware of the following critical hazards in machine operations and take steps to eliminate them if they exist: 1. No enclosure or interlock system on revolving container. 2. Exposed fan blades. 3. Fixed location machines not securely anchored. 4. Belts, pulleys or gears not guarded. 5. Inadequate or improperly adjusted guards. 6. Inadequate or no automatic cutoff. 7. Awkward location of controls or adjustments. 8. Operating treadle not covered 9. No workrest or improperly adjusted workrest. 10. Safety devices bypassed 11. Excessive travel 12. Improper maintenance 13. Improper electrical ground 14. Inadequate eye protection 15. etc. If any of the above conditions are noticed the machine should not be operated. If in operation, shut down the machine and notify your supervisor.
B. Importance of guarding Teacher Note: At this point a tour through the school shops or a local shop should be made for the purpose of observing machine guards and safety hazards. Each student should observe, list and report any machine guarding hazards noted.	Unguarded machinery is a principal source of accidents which cause injury. The severity of injury is normally high. Machines designed to cut wood or metal have little trouble amputating fingers, arms, or legs. Remember that even a temporary lapse of caution can result in severe injury from an unguarded machine.

Lesson Outline	Lesson Script
Guard Construction	Guards must be so constructed that they will give optimum protection against: 1. shock 2. burns 3. cuts 4. bruises 5. pinches 6. crushing
Shock Show Transparency #3-16	There are three major causes of electrical shock which must be grarded against. a. ungrounded equipment b. inadequate guarding of exposed circuitry c. inadequate insulation of electrical conductors.
Burns Show Transparency #3-17	Burns are caused by contacting sources of heat such as: 1. material super heated by friction. 2. overheated electrical systems or devices. 3. flames Properly guarded equipment would prevent these injuries.
Cuts, Bruises, Pinches and Crushing Show Transparency #3-18	The causes of cuts, bruises, pinches, and crushing when operating machines are improperly guarded: 1. pinch points - points where two moving parts of a machine separate and come together. 2. shear points - points where two moving parts of a machine pass each other closely. (like scissors) 3. catch points - moving parts of machines which have sharp corners or rough shapes. 4. Run in points - points where two objects are in contact with each other and rotating inward.

Lesson Outline	Lesson Script
Types of Guards Show Transparency #3-19	There are four basic types of machine guards: 1. Fixed - The guard is stationary 2. Interlocking - The guard must be in place before the machine can be operated. 3. Automatic - The guard moves the operator away from the danger point. 4. Tripping - A photo-electric device or a trip bar keeps the machine cut off until hands are clear, or both hands must be used to actuate the equipment at a point remote from the work.

Examination

This is a multiple choice examination. Place the letter designator for the correct answer or phrase in the space provided at the left of the question.

___1. The severity of injury from accidents caused by operation of unguarded machinery.
  a. low
  b. high
  c. negligible
  d. favorable

___2. Shock, burns, cuts, and pinches are examples of injuries which could be prevented by:
  a. larger nursing staffs
  b. closer supervision
  c. machine guarding
  d. foremen

___3. The three major causes of electrical shock are:
  a. ungrounded equipment, high voltage, inadequate insulation.
  b. high current, high voltage, ungrounded equipment.
  c. ungrounded equipment, high current, inadequate guarding of exposed circutry.
  d. ungrounded equipment, inadequate guarding of exposed circutry, inadequate insulation.

___4. Where two moving parts of a machine come together and then separate is known as:
  a. shear point
  b. pinch point
  c. catch point
  d. run in point

___5. Moving parts of a machine which have sharp corners or rough shapes are known as:
  a. run in points
  b. catch points
  c. pinch points
  d. shear points

Examination

___ 6. The point where two objects (such as gears) are in contact with each other and are rotating inward is called:
a. pinch point
b. catch point
c. shear points
d. run in points

___ 7. The point where two moving parts of a machine pass each other closely like scissors is called:
a. catch point
b. shear point
c. run in point
d. pinch point

___ 8. A stationary guard is known as a/an:
a. automatic guard
b. tripping guard
c. interlocking guard
d. pinch point

___ 9. "The guard must be in place before the machine can be operated," describes a/an:
a. automatic guard
b. tripping guard
c. interlocking guard
d. fixed guard

___10. "The guard moves the operator away from the danger point," describesa/an:
a. automatic guard
b. tripping guard
c. interlocking guard
d. fixed guard

OCCUPATIONAL SAFETY AND HEALTH
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Block #3 Lesson Plan #2 Page #1

Examination Key

[illegible] 1.

c 2.

d 3.

b 4.

b 5.

d 6.

b 7.

d 8.

c 9.

a 10.

OCCUPATIONAL SAFETY AND HEALTH
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Block #4 Lesson Plan #1 Page #1

Lesson Title: Housekeeping Title Transparency 4-1

Clock Hours: 30 minutes

Show Transparency #1

Terminal Objectives: Upon completion of this lesson plan the students will understand the reasons for good housekeeping, know typical accidents caused from poor housekeeping, and what constitutes good housekeeping; and will demonstrate their knowledge by completing with 100% accuracy a 5 question multiple choice examination on the subject.

Teaching Materials:

1. This lesson plan
2. Transparency Pack #4-1
3. Overhead Projector
4. Examination Block #4 Lesson Plan #1
5. Examination Key Block #4 Lesson Plan #1

References:

Blake, Roland P. Industrial Safety, Prentiss Hall, N.J. 1963, pp. 138-144.

Federal Register. Occupational Safety and Health Standards, 29CFR1910.

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Block #4 Lesson Plan #1 Page #2

Lesson Outline	Lesson Script
A. Good Housekeeping Show Transparency #4-2	Good housekeeping not only signifies cleanliness, but a place for everything and everything in its place.
	In order for this condition to exist constant and proper attention must be given to the condition of the work area.
A clean place	A place is clean when it is free from unnecessary things.
An orderly place	It is in order when everything is in its proper place, properly arranged and in proper condition.
	Note: A clean and orderly work area is not only a safe area, but will impress superiors with your competent management and efficient workmanship.
B. Typical Accidents Due to Poor Housekeeping Show Transparency #4-3	1. Tripping over loose objects 2. Falling articles 3. Slipping on wet or oil floors. 4. Bumping into misplaced materials. 5. Cutting hands or other parts of body on sharp materials. 6. Fires
C. Typical Items of Unsafe Housekeeping Show Transparency #4-4	1. Excessive material or waste in working area. 2. Aisles congested 3. Tools out of place 4. Waste containers overloaded 5. Chemicals in open containers 6. Oil or water spills 7. Poor lighting 8. Broken glass 9. Nails, hooks, or other exposed projections.

Lesson Outline	Lesson Script
D. Methods of Preventing Poor Housekeeping Accidents	1. Plan and layout your work area. 2. Anticipate items that will clutter or otherwise make the work area dangerous such as wax, dust, spillage, etc, and provide for their control: a. Receptacles for trash b. Drip pans for liquid spills c. Container for chips, shavings, etc. d. Storage bins 3. Use cabinets and holders which are provided for tools. 4. Keep materials in process in proper order.

Examination

This is a multiple choice examination. Place the proper letter designator for the most correct answer or phrase in the space provided at the left of the question number.

___ 1. Good Housekeeping is:
   a. Cleanliness
   b. A place for everything
   c. Everything in its place
   d. All of the above

___ 2. A place is clean when:
   a. Dust is removed
   b. Oil is removed
   c. Free of dirt and oil
   d. Free from unnecessary things

___ 3. Of the following, which is not an example of an accident caused by poor housekeeping?
   a. Slipping on an oily floor
   b. Cutting fingers on a saw while working with it.
   c. Cutting hands or other parts of body on loose scrap material.
   d. Tool falling on foot from workbench

___ 4. Most oil spillage on floors can be prevented by use of:
   a. Oil cans
   b. Use of rags
   c. Trash receptacles
   d. Drip pans

___ 5. Loss of or damage to tools by falling can be prevented by:
   a. Proper cleaning
   b. Using them for the proper job
   c. Returning them to their proper place or container
   d. Placing them on bench

Examination Key

_d_ 1.

_d_ 2.

_b_ 3.

_d_ 4.

_c_ 5.

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Block #4 Lesson Plan #2 Page #1

Lesson Title: Review and Evaluation
Title Transparency #4-5.

Clock Hours: 90 minutes

Terminal Objectives: At the conclusion of this lesson plan the students should know the general safety rules covered, be able to apply the general safety rules covered to a given area; and will demonstrate their ability for participating in the construction of safety rules for elevators, ladders, scaffolds, and offices; and by completing with 100% accuracy a 50 question true/false examination on the subject.

Teaching Materials:

1. This lesson plan.
2. Examination #4-2
3. Examination Key #4-2

References: A Guide to Voluntary Compliance. Student Manual, U.S. Dept. of Labor, OSHA-2088.

Strasser, Aaron, Bohn, Eales. Fundamentals of Safety Education, Macmillan, N.Y., 1964.

Accident Prevention Manual for Industrial Operations. National Safety Council, Chicago, 1972.

Florio, A.E., Stafford, G.T. Safety Education, McGraw-Hill, N.Y., 1962.

Fawcett, H.H., Wood, W.S. Safety and Accident Prevention in Chemical Operations, Interscience Publishers, N.Y., 1965.

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Block #4 Lesson Plan #2 Page #2

Lesson Outline	Lesson Script
General Safety Instructions Teachers note: For each block of instruction have class give as many rules as possible - list class rules - add any from lesson script list that they have missed - have each class member make a copy of the list.	This is the last of the series of lesson plans titled, Occupational Safety and Health for Work Experience and O.J.T. Programs. In this session we will review general safety rules in all of the areas covered in the program and apply our knowledge gained from their study to develop some general safety instructions for other areas.
Block #1 Fire Safety	1. Inspect all electrical equipment and wiring for, proper grounding, signs of wear, cuts, poor connections, etc., before use. 2. Smoke only in designated smoking areas. (better yet - do not smoke at all). 3. Keep close check on temperature controls of equipment. 4. Lubricate all friction points on a regular schedule. 5. Keep open flames away from combustible material and vice-versa. 6. Control sparks when open burning. 7. Dispose of oily waste or oil impregnated materials in proper container to prevent spontaneous combustion. 8. Know the location of fire doors, etc., to be closed in case of fire. 9. Keep working stock clean and remove foreign materials from equipment to prevent sparking. 10. Keep combustible liquids and chemicals away from sources of heat, shock, pressure, and other chemicals.

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Block #4 Lesson Plan #2 Page #3

Lesson Outline	Lesson Script
	11. Use extreme caution when handling molten substances.
	12. Insure grounding of all equipment subject to the building and discharge of static electricity especially in a flammable or explosive environment.
	13. When welding or cutting metals insure that all flammable objects are removed or protected.
	14. Use only sparkproof tools and explosion proof lights and electrical equipment in an environment with a heavy concentration of fumes, dusts, vapors, or gasses.
	15. Use only the proper type of extinguisher and/or agent on fires.
	16. Sound the alarm immediately when fire is discovered.
	17. Do not carry strike matches anywhere.
	18. Unless fire is extremely small and can be extinguished immediately without aid of an extinguishing agent - do not attempt to extinguish until alarm is sounded.
Block #2 Material Handling	1. Do not handle manually if a machine or equipment can better do the job.
	2. If lifting and carrying by hand first: a. inspect for slivers, jagged edges, burrs, rough or slippery surfaces b. wipe off greasy, wet, slippery, or dirty objects c. remove oil or grease from hands d. remove all trip obstacles in path and insure that there is no spillage to cause slipping.

Lesson Outline	Lesson Script

- e. insure that there is sufficient clearance
- f. consider the size and weight. (do not lift more than can be handled comfortably)
- g. set feet solidly
- h. get as close to object to be lifted as possible

3. To lift an object:

    - a. bend legs about 90° at knees
    - b. crouch do not squat
    - c. bend at the hips
    - d. keep back straight
    - e. grip object firmly
    - f. if grip must be changed set object down first
    - g. lift by straightening the legs
    - h. keep back straight

4. To carry an object:

    - a. do not carry a load that you cannot see over or around
    - b. make sure path is clear
    - c. carry close to the body
    - d. to change direction use the feet do not twist at the waist
    - e. keep the back straight
    - f. balance the load
    - g. if load is too heavy or clumsy get help
    - h. if two people are carrying balance load and keep level
    - i. when carrying objects on shoulders, use shoulder pads

5. When using hand operated material handling equipment:

    - a. select the equipment best suited to the job
    - b. always wear gloves and safety shoes
    - c. use only two wheeled trucks and wheelbarrows which have been equipped with handguards

Lesson Outline	Lesson Script
	d. keep the center of gravity low
	e. keep feet from under wheels
	f. set brakes or chock wheels when loading
	g. balance, let the truck carry the load
	h. move at safe speed
	i. never walk backwards
	j. equipment should always be pushed - except when going up an incline
	k. secure load
	l. never pull a load with rope, chain, or cable
	m. never move equipment which you cannot see over or around unless a second person is being used as a spotter
	n. store equipment with handles locked in up position
	o. keep hands inside sides of equipment or load when moving
	p. use only jacks that have a capacity rating for the job
	q. do not jack at an angle
	r. do not use extra extenders between jack head and load
	s. always use a piece of wood between jack head and load to prevent slipping and damage to load
	t. always block load before moving underneath it
	u. always wear proper protective equipment when handling hazardous materials
6. Machine Handling	a. Before using, perform walk around inspection to determine condition. (1) check for wear (2) check for broken or cracked parts (3) check for lubrication (4) check for safety guards (5) check cables, ropes, for fraying or other signs of wear (6) check water level in batteries (7) check for unsafe wiring and electrical connections

Lesson Outline	Lesson Script
	(8) check tires for proper inflation (9) check for gas, oil, brake fluid, transmission fluid, and water levels and leaks b. never operate equipment when an unsafe condition exists c. never operate equipment when not authorized or trained to operate it d. never perform service or maintenance on operating equipment - turn it off e. never operate at high rate of speed f. check all systems for proper operation g. do not use if not operating correctl h. remove all foreign matter before operating
7. Handling of Hazardous Materials	a. observe warnings on labels and markings b. if uncertain ask your supervisor c. know and observe warnings d. wear proper protective equipment
Block #3 Protective Equipment	In hazardous environments where safety engineering is not adequate:
1. Personal Protective Equipment	a. always wear proper hand protectors - gloves - pads - etc. b. always wear proper protective clothing - aprons - coveralls - suits - etc. c. always wear proper foot and leg protectors - safety shoes - steel footguards - chemical resistant shoes - non-conductive shoes - leggings - boots - etc. d. always wear proper eye and face protectors - spectacles, goggles - shields - hoods - etc. e. always wear proper hearing protective devices - plugs - muffs

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Block #4 Lesson Plan #2 Page #7

Lesson Outline	Lesson Script
	f. always wear proper head protectors - hard hats - safety caps
	g. always use proper respiratory equipment - air supplied - air purifying
	h. always use proper safety belt when working at heights above ground level
	i. if in doubt as to the proper equipment, request instruction from qualified person
	j. if in doubt as to how to use equipment, request instruction from qualified person
2. Machine Guards	a. assure that all moving parts are shielded from contact
	b. assure that all electric equipment is grounded
	c. assure that all electrical contacts are shielded
	d. never disable safety or interlocking devices
	e. never remove a guard
	f. replace guards that have been removed
	g. never reach into danger zones
	h. clean guards before use
	i. do not readjust guard
	j. do not start unless guards are in place
	k. lock or tag switches when guards are removed for maintenance
	l. do not wear loose fitting clothing rings - necklaces - neckties - etc., while operating a machine or near a machine
	m. report any unguarded equipment to supervisor
Block #4	
1. Housekeeping	a. keep work area clean
	b. keep work area orderly
	c. keep loose objects off of floor

Lesson Outline	Lesson Script
	d. keep scrap in proper containers e. empty waste containers before they overflow f. remove broken glass g. find and remove exposed projections such as nails, hooks, etc. h. wipe up spills immediately i. use storage bins j. use drip pans k. place tools in proper racks or holders
Review and Evaluation Teacher note: Have students study their safety rules. Have class in a joint effort construct a set of safety rules for ladders and scaffolds elevators and offices. Teacher Note: The evaluation for this lesson plan may be used as a final examination and could be used as a pre-exam also - comparison of the pre-test and post-test could then be used to evaluate the program.	

OCCUPATIONAL SAFETY AND HEALTH
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Block #4 Lesson Plan #2 Page #1

Examination

This is a true/false examination. Place a (√) check mark in the appropriate space provided at the left of the statement.

True False

T____ F____ 1. All electrical equipment requires grounding.

T____ F____ 2. Automatic temperature controls require no monitoring.

T____ F____ 3. Open burning presents no fire hazard.

T____ F____ 4. It is safe to store all chemicals together.

T____ F____ 5. Sound the alarm before attempting to extinguish fire.

T____ F____ 6. Strike anywhere matches should not be carried.

T____ F____ 7. Any fire extinguishing agent is better than none.

T____ F____ 8. Fire doors should be closed to keep fire from spreading.

T____ F____ 9. Some fire extinguishers may cause fire to spread.

T____ F____ 10. Friction points should be wiped clean of oil.

T____ F____ 11. Manual handling of material is preferred to machine handling.

T____ F____ 12. If load is too heavy to lift, use another person or a machine.

T____ F____ 13. Brace a load you are carrying with your knee while changing grip.

T____ F____ 14. Legs should be kept straight when lifting.

T____ F____ 15. The back should not be bent when lifting.

T____ F____ 16. Gloves and safety shoes are not needed when using hand operated material handling equipment as all safety factors are built in.

T____ F____ 17. The center of gravity should be kept low when loading hand operated material handling equipment.

T____ F____ 18. When using a two wheel hand truck the handles should always be held as low as possible.

Examination

True False

T____ F____ 19. The proper method of moving hand trucks, dollies, etc., is to push--except up hill.

T____ F____ 20. If jack is not high enough,use extra wooden extender between jack head and load.

T____ F____ 21. Since time is money in business all material handling should be done as rapidly as you can move.

T____ F____ 22. If material handling equipment has handles, the handles should be stored in the up position.

T____ F____ 23. Most jacks are dangerous, however, it is safe to work under a load supported by a hydraulic jack without blocking.

T____ F____ 24. To operate material handling material one should have proper instruction and direction.

T____ F____ 25. It is permissable to use frayed cables and ropes since they are usually under-rated.

T____ F____ 26. It is O.K., to operate equipment with unsafe conditions as long as they are tagged.

T____ F____ 27. Since maintenance personnel are responsible to maintain equipment, you may assume that it is safe to operate.

T____ F____ 28. Since electricity is dangerous. only a qualified electrician may check for unsafe wiring.

T____ F____ 29. Checking the proper inflation of tires is the users responsibility.

T____ F____ 30. All hazardous materials require special handling.

T____ F____ 31. Safety glasses take the place of goggles.

T____ F____ 32. Hazardous materials are always in special containers, thereby, protective equipment need not be worn.

T____ F____ 33. Asking your supervisor questions about safety is not a good idea.

T____ F____ 34. Wearing gloves causes clumsiness and should not be done when handling materials.

OCCUPATIONAL SAFETY AND HEALTH
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Block #4 Lesson Plan #2 Page #3

Examination

True False

T___ F___ 35. Hard hats, safety caps, etc., are only to be worn by construction workers.

T___ F___ 36. Personal protective equipment is a second line of defense and should only be used when engineering cannot eliminate a hazard.

T___ F___ 37. Hearing protective devices do not eliminate all noise hazards.

T___ F___ 38. All moving parts of machines must be shielded from contact.

T___ F___ 39. Modern machinery is constructed so that safety guards are not needed.

T___ F___ 40. After equipment is placed in operation safety guards must be adjusted.

T___ F___ 41. Interlocking safety devices may safely be disabled once machines are operating.

T___ F___ 42. Locking or tagging electrical switches is required when machines are being repaired.

T___ F___ 43. If machines have no guards, you may assume that they are so designed and thereby safe to operate.

T___ F___ 44. Inspection of your work area for hazards is your employer's responsibility only.

T___ F___ 45. Cleaning your work area is the job of janitorial personnel.

T___ F___ 46. Tools should not be returned to racks or containers until the end of the day as you might need them again.

T___ F___ 47. Wipe up oil spills and empty trash or scrap containers only at the end of your shift.

T___ F___ 48. Loose fitting clothing is dangerous and should not be worn when operating machinery.

T___ F___ 49. Common sense will tell you when a health hazard exists.

T___ F___ 50. Do not report minor injuries as you will be considered an unsafe worker.

OCCUPATIONAL SAFETY AND HEALTH
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Block #4 Lesson Plan #2 Page #1

Examination Key

True	False		True	False		True	False	
T ✓	F	1.	T	F ✓	23.	T	F ✓	45.
T	F ✓	2.	T ✓	F	24.	T	F ✓	46.
T	F ✓	3.	T	F ✓	25.	T	F ✓	47.
T	F ✓	4.	T	F ✓	26.	T ✓	F	48.
T ✓	F	5.	T	F ✓	27.	T	F ✓	49.
T ✓	F	6.	T	F ✓	28.	T	F ✓	50.
T	F ✓	7.	T ✓	F	29.			
T ✓	F	8.	T ✓	F	30.			
T ✓	F	9.	T	F ✓	31.			
T	F ✓	10.	T	F ✓	32.			
T	F ✓	11.	T	F ✓	33.			
T ✓	F	12.	T	F ✓	34.			
T	F ✓	13.	T	F ✓	35.			
T	F ✓	14.	T ✓	F	36.			
T ✓	F	15.	T ✓	F	37.			
T	F ✓	16.	T ✓	F	38.			
T ✓	F	17.	T	F ✓	39.			
T	F ✓	18.	T	F ✓	40.			
T ✓	F	19.	T	F ✓	41.			
T	F ✓	20.	T ✓	F	42.			
T	F ✓	21.	T	F ✓	43.			
T ✓	F	22.	T	F ✓	44.			

NARRATIVE

Introduce the topic and go over the attached questions in class. Ask that each student complete the form as it applies to his job and return it completed next week.

Student's Name______________________________

SAFETY ON THE JOB

1. List possible safety/health hazards of your position at the place you work:

2. Possible ways to avoid or neutralize these hazards/reducing accidents:

3. List safety measures you have learned specifically for your job/equipment you handle:

4. List safety clothing and/or equipment you should use:

5. Are there safety rules for driving company vehicles? If yes, list:

6. Should an accident occur, what is the procedure to be used at your job:

7. Where is first aid equipment, fire extinguisher, fire alarm (draw area and label those items asked for above on reverse side):

8. Who among your coworkers has First Aid training? List:

9. Accidents should be reported to: (Name and position)

10. What are emergency phone numbers to be used at your work:

    Fire_______________

    Police_______________

    Ambulance__________

**Check these answers with your supervisor, please, and get his signature.

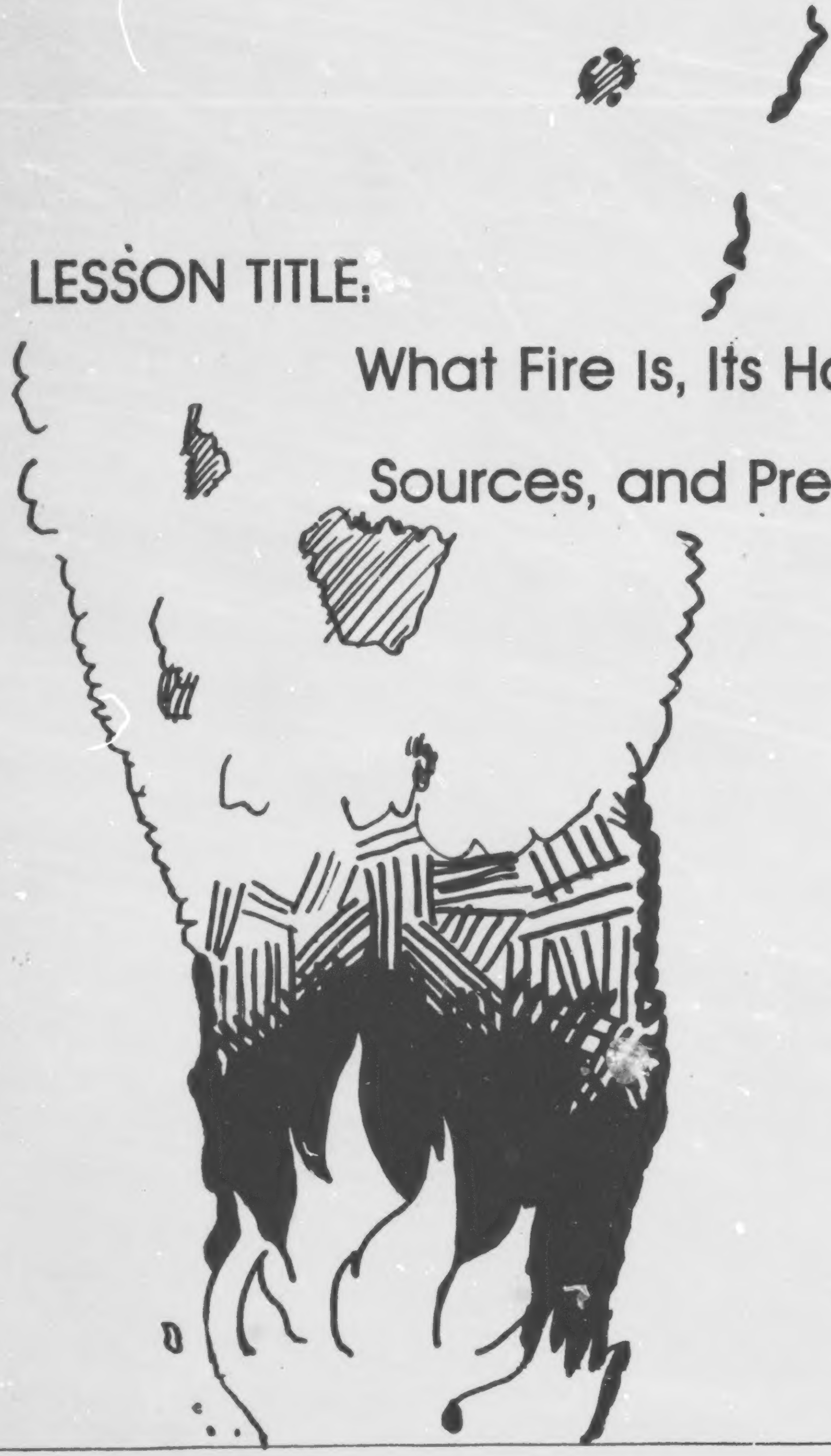
____
(Signature of Supervisor)

TRANSPARENCY MASTERS

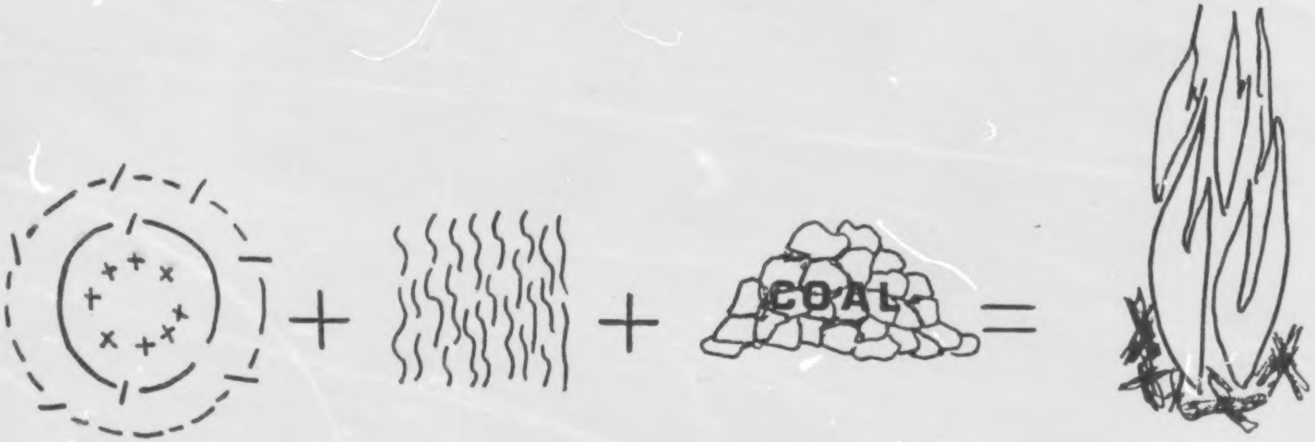
The following transparency masters are numbered at the bottom of each page, to correspond with the block they are designed for. (Example: 1-1 is the first transparency for Block 1).

LESSON TITLE:

What Fire Is, Its Hazards, Sources, and Prevention?



Fire Formula



Oxygen + Heat Energy + Fuel = Fire

Physical Hazards are further brokendown into two types;

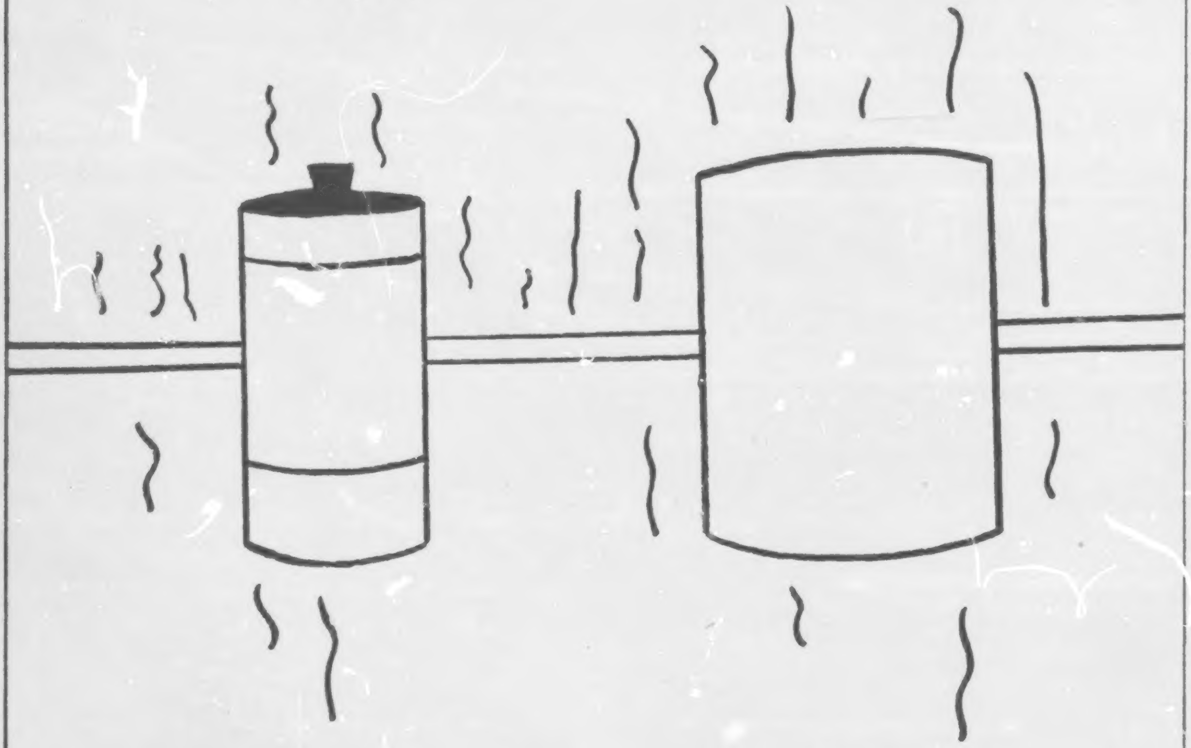
a. Damage to property

b. Injury
    (1) pain
    (2) blistering or charring of flesh
    (3) possible disfigurement
    (4) possible crippling
    (5) blindness from heat or light of fire
    (6) scorching of lungs and air passages
    (7) Asphyxiation

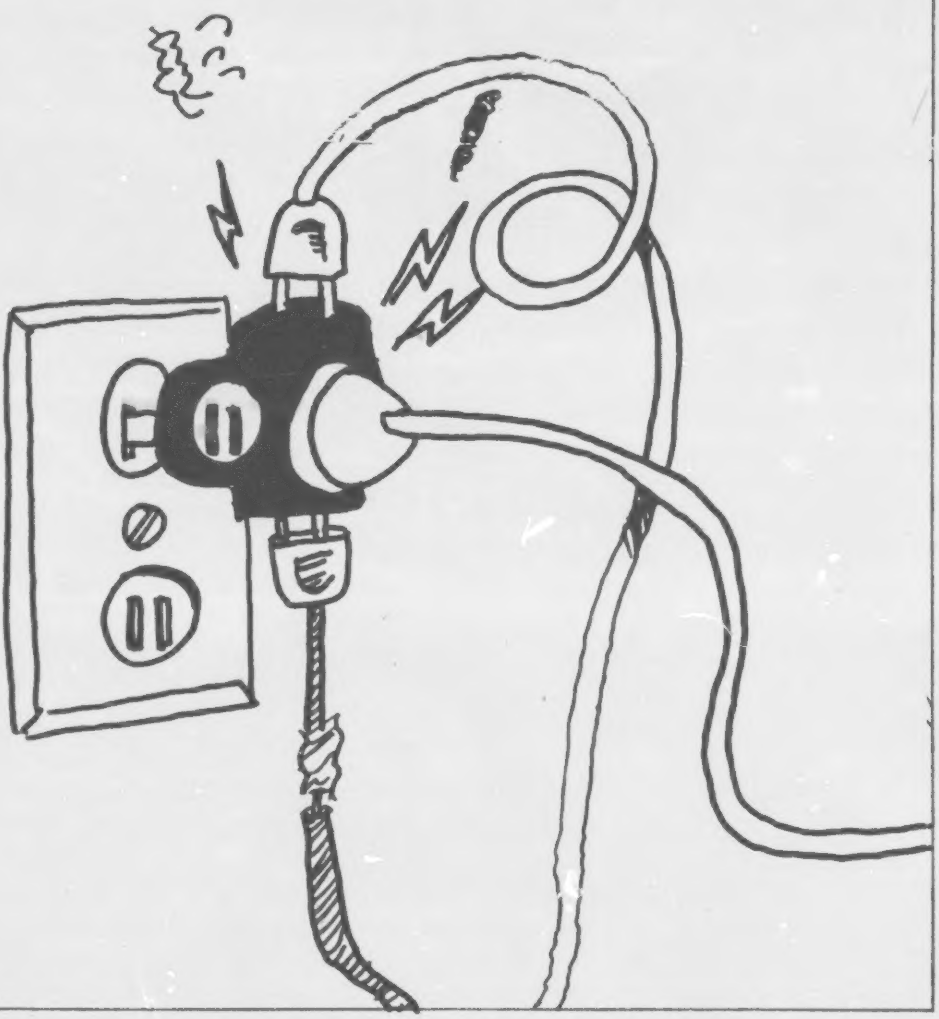
The health hazards are:

a. Oxygen deficiency

b. Toxic fumes, vapors, mists, gases, which are created from increased heating of chemicals liquids, and metals.



23% of all fires are electrical fires

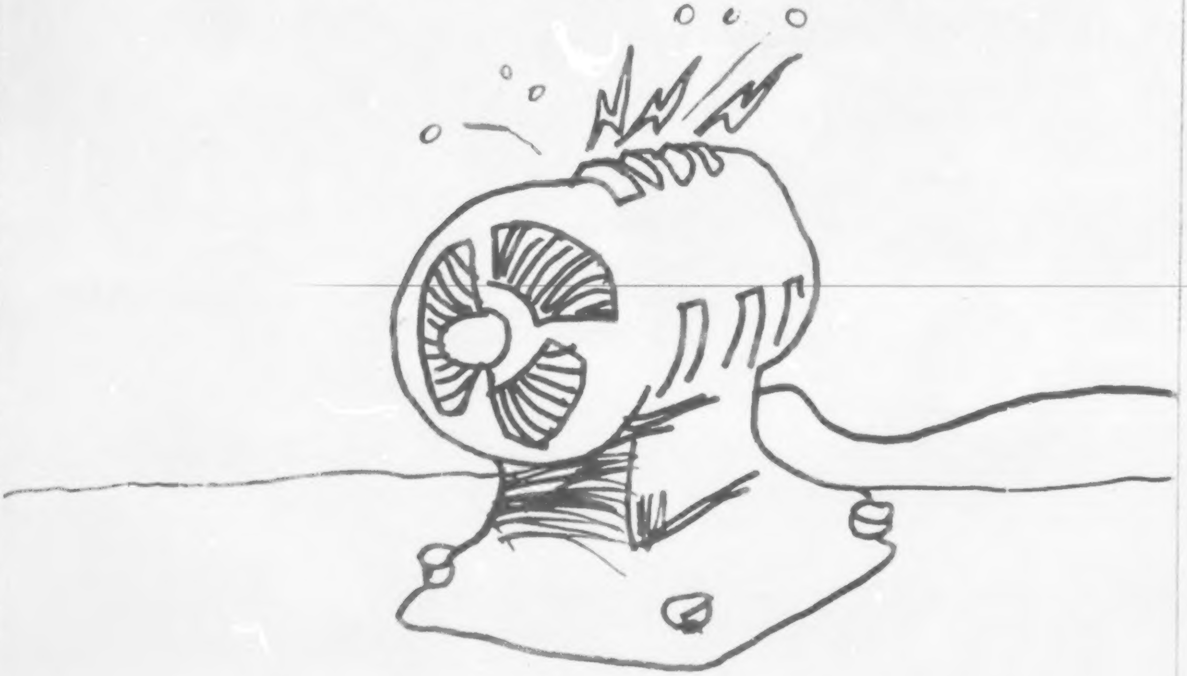


SMOKING (18%)

Smoking cigarettes cause 18% of all fires

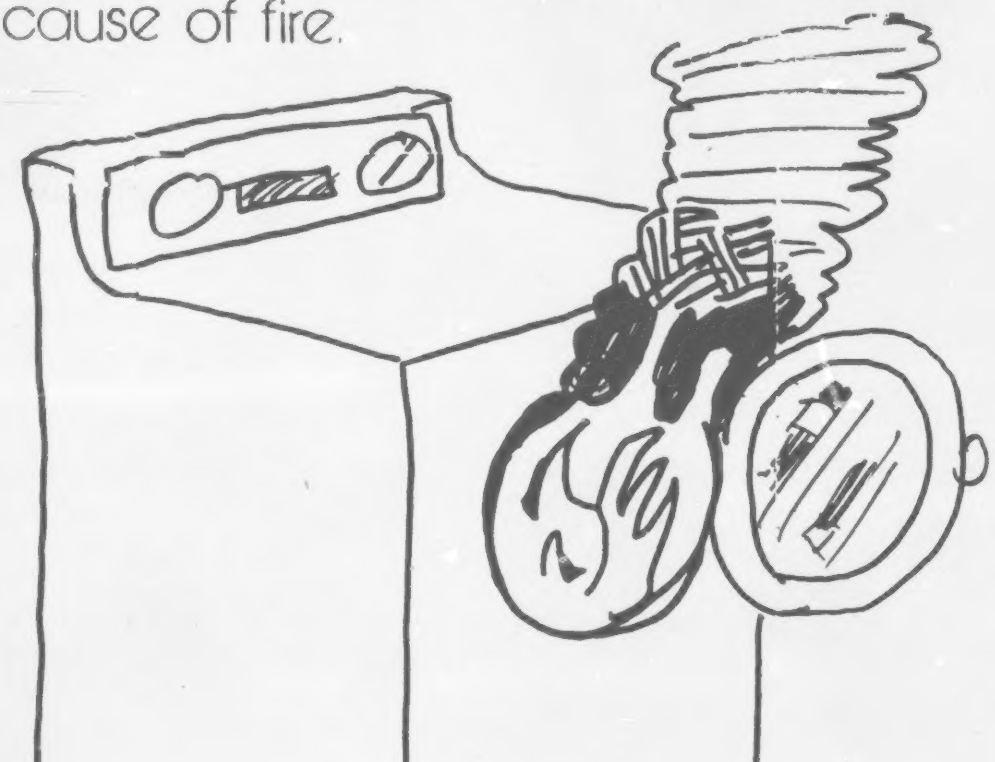
FRICTION (10%)

Third leading cause of fire is caused by hot bearings, broken machine parts, etc. resulting in friction heat.



Overheated Materials 8%

Flammable liquids and materials in dryers, etc. is the fourth leading cause of fire.



(LISTINGS OF OTHER CAUSES OF FIRE)

HOT SURFACES--BURNER FLAMES--

COMBUSTION SPARKS--EXPOSURE--

INCENDIARISM--MECHANICAL SPARKS--

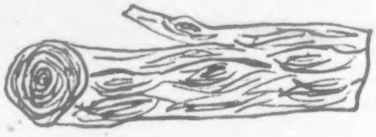
ACTION--STATIC SPARKS--LIGHTING

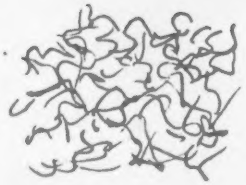
MOLTEN SUBSTANCES--CHEMICAL

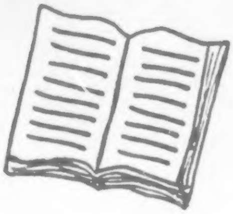
LESSON TITLE:

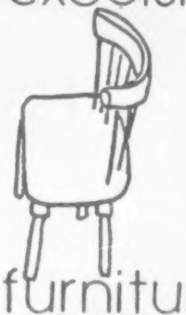
Recognition of Classes of Fire-- Controling Fire-- Extinguishing Fire-- Steps to Take When You Discover a Fire.

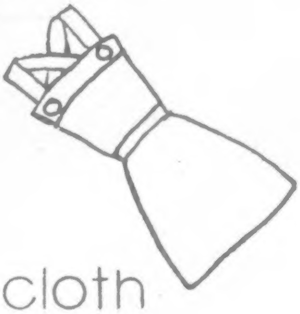
CLASS "A" FIRES
(Ordinary Solids)

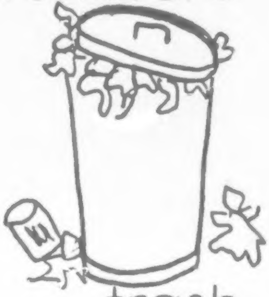

wood


excelsior


paper


furniture

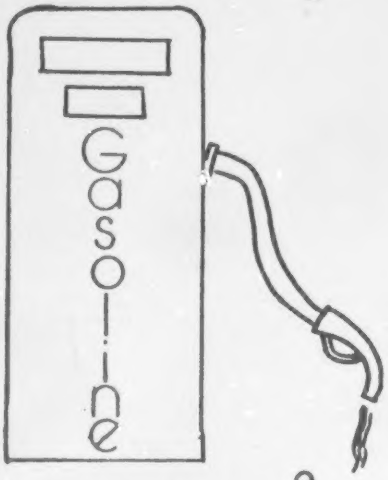

cloth

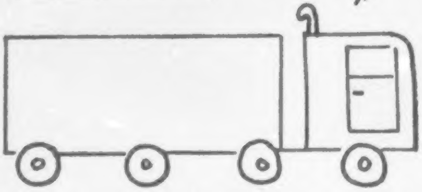

trash

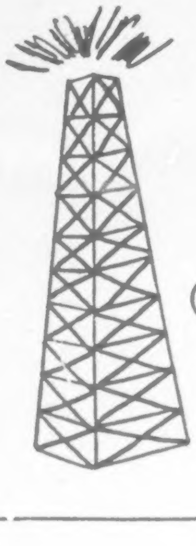
etc.

Class "B" Fires

(Liquid)




Diesel Oil

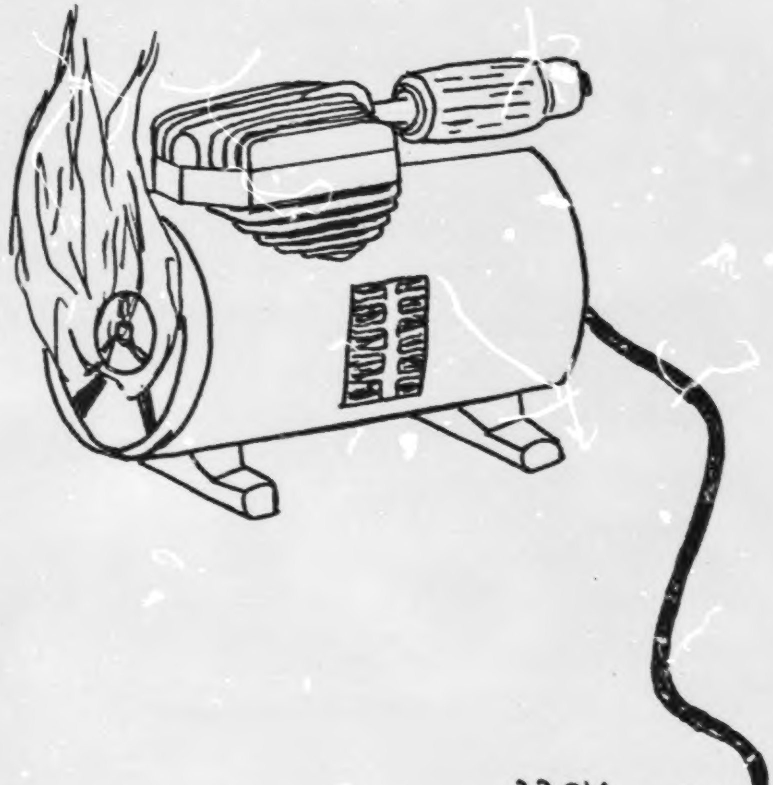

Oil

Solvents

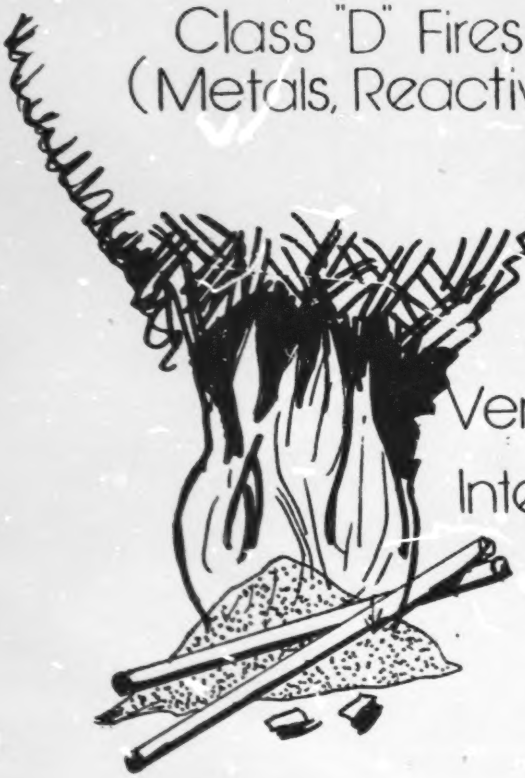
Paint

Thinner

Class "C" Fires
(Electrical)



Class "D" Fires
(Metals, Reactive Chemicals)



Very
Intense
Light

Magnesium
Titanium
etc.

Four Fire Control Methods

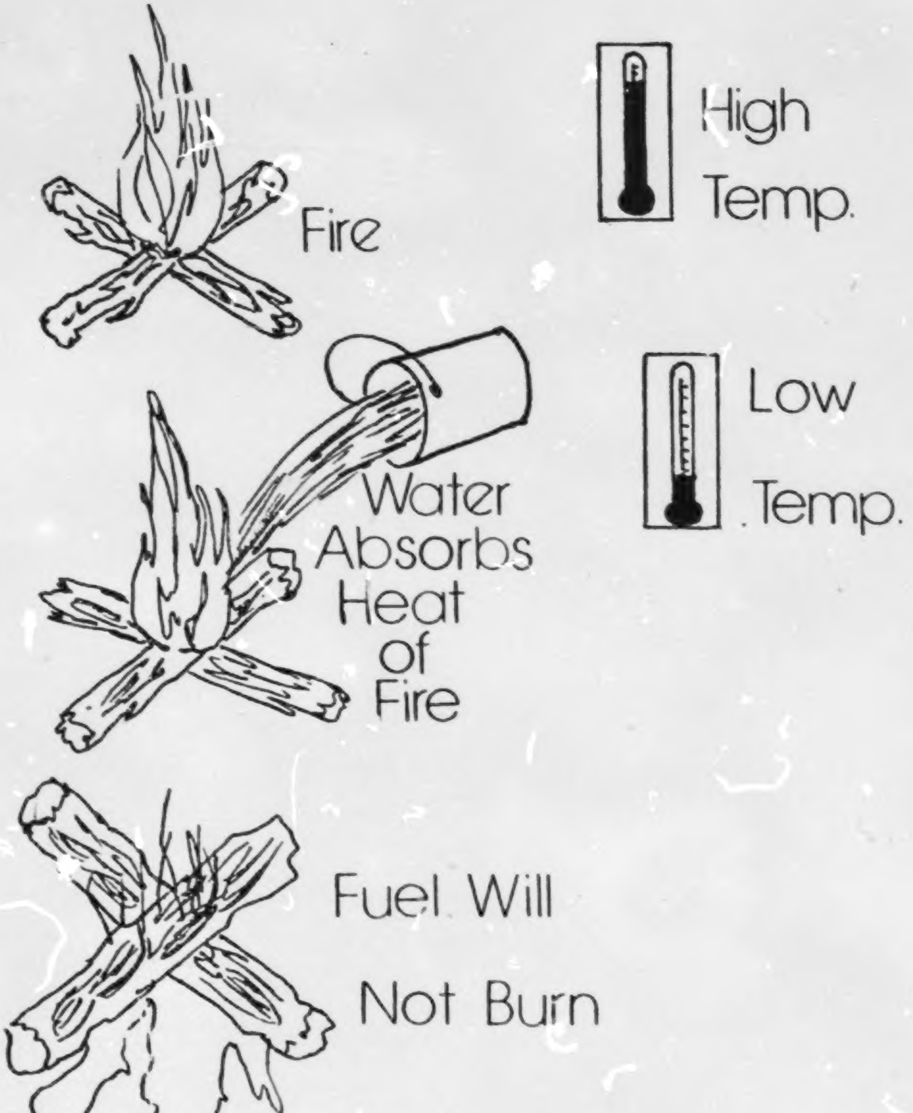
1. Cooling

2. Removing Fuel

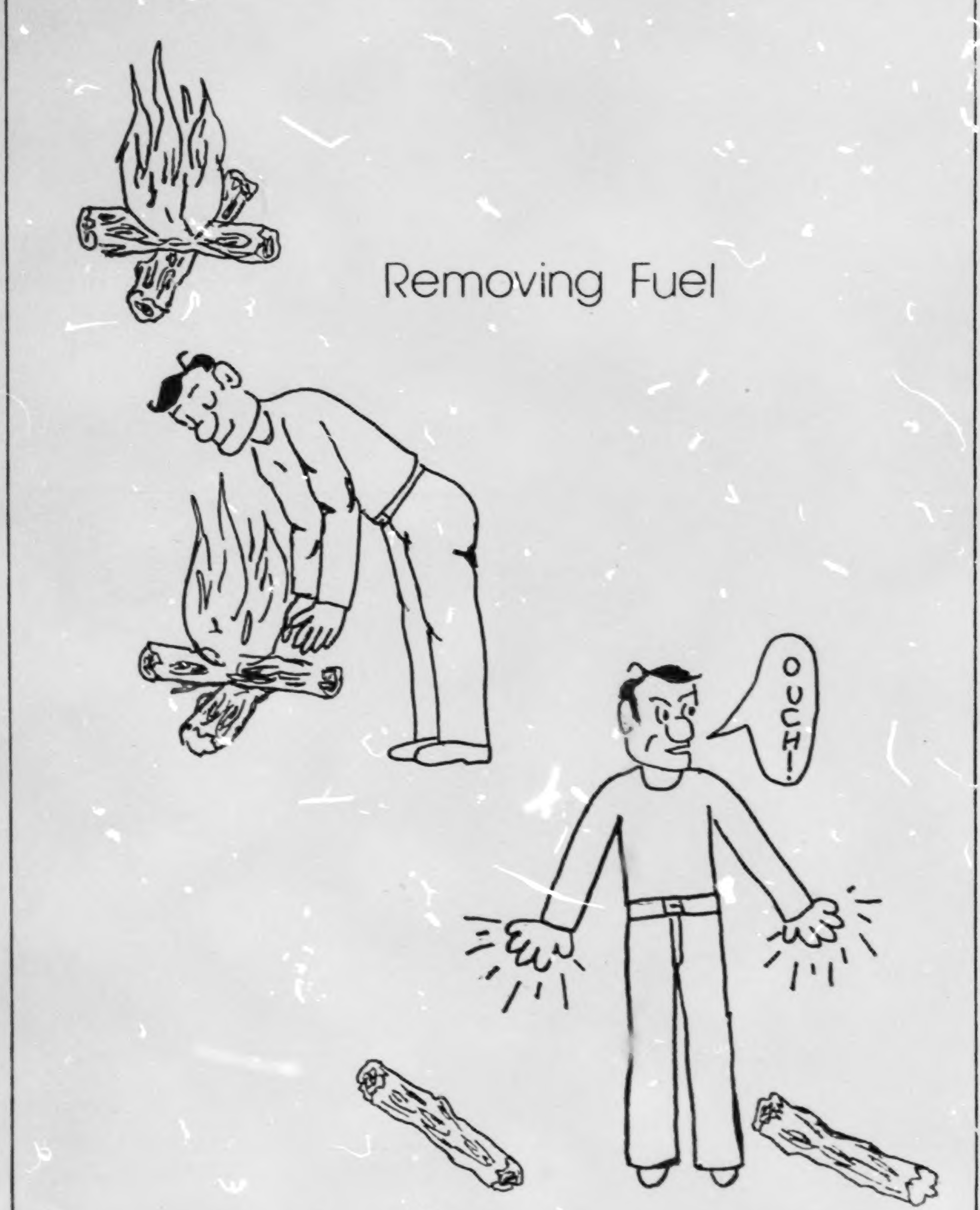
3. Removing Oxygen

4. Inhibiting the Reaction

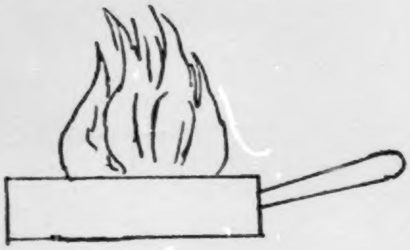
Cooling


Fire
High Temp.
Water Absorbs Heat of Fire
Low Temp.
Fuel Will Not Burn

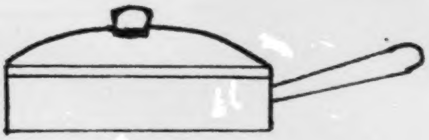
Removing Fuel



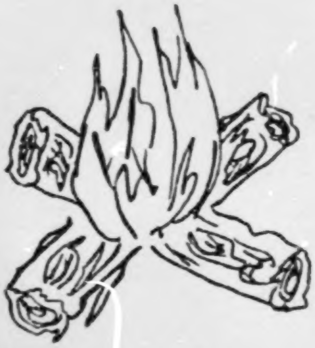
Removing Oxygen



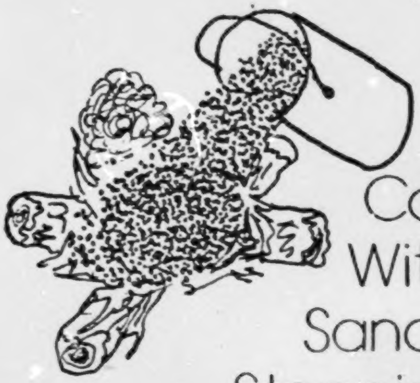
Grease Fire



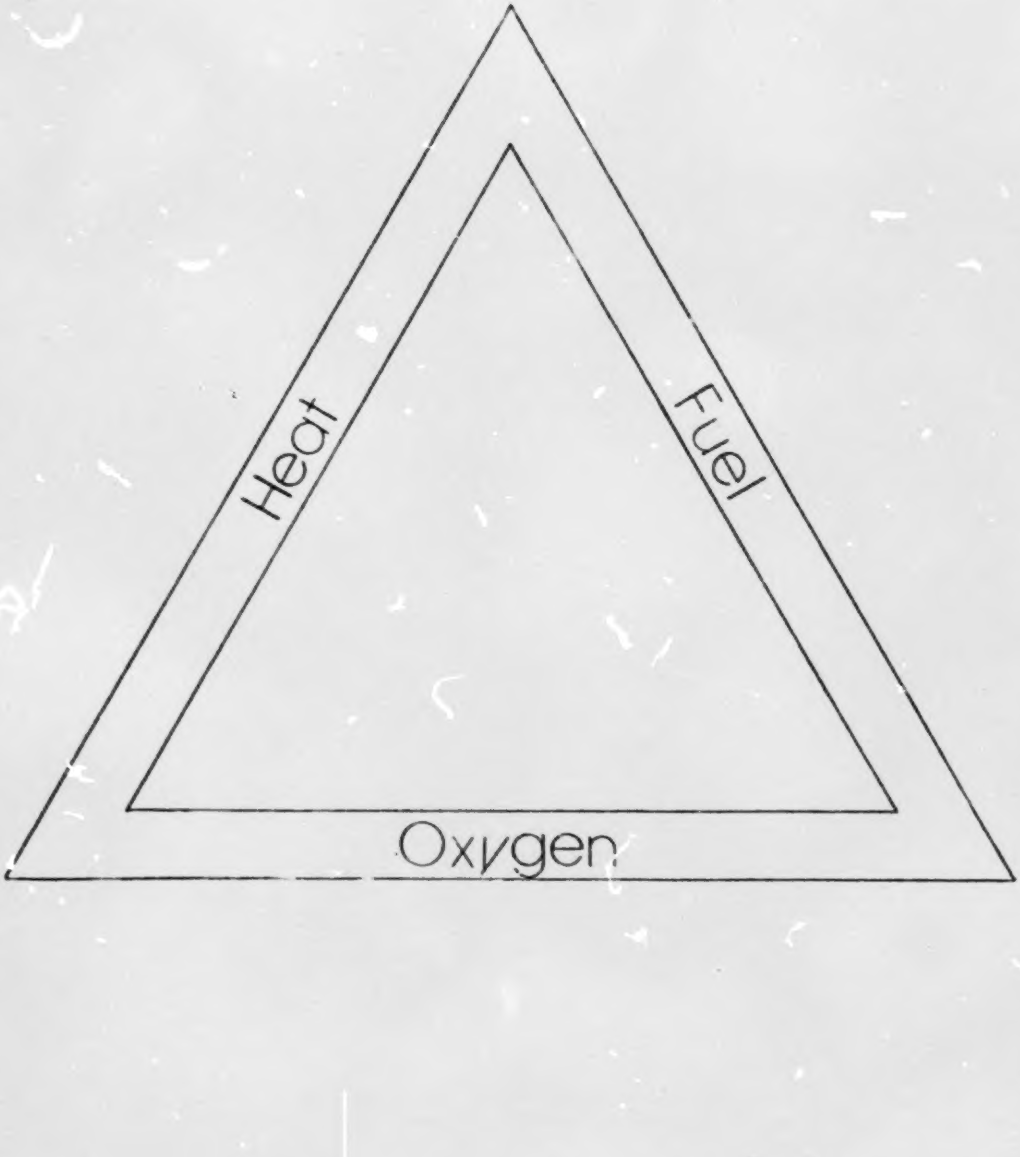
Cover Stopping Oxygen Supply



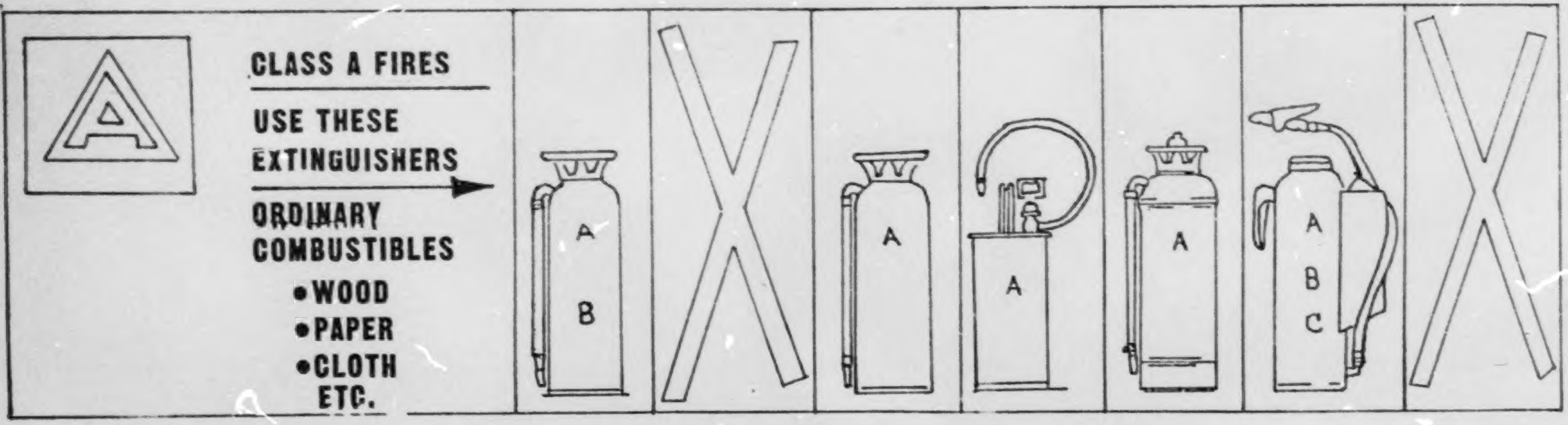
Wood Fire



Cover With Sand Stopping Oxygen Supply


Heat
Fuel
Oxygen

1-20-a



CLASS A FIRES

USE THESE EXTINGUISHERS

ORDINARY COMBUSTIBLES

- WOOD
- PAPER
- CLOTH

ETC.

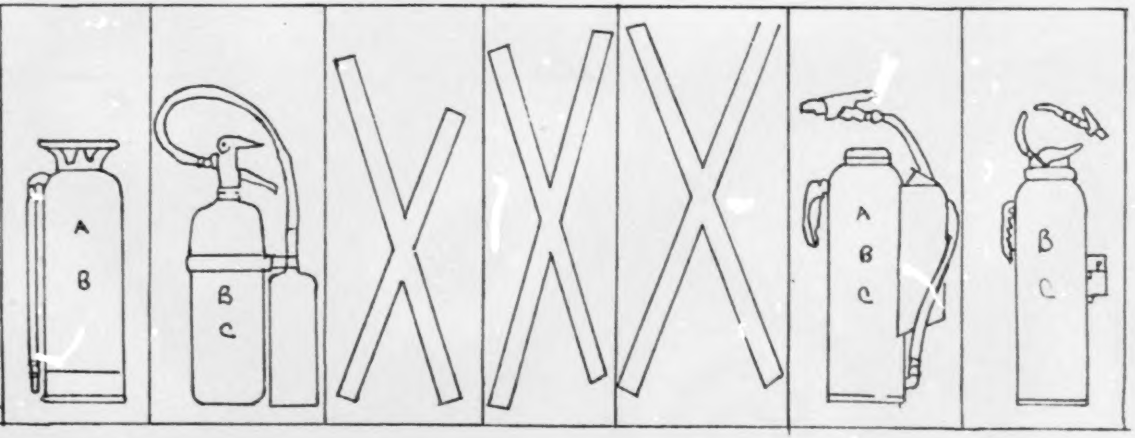
1-20-b

CLASS B FIRES

USE THESE EXTINGUISHERS →

FLAMMABLE LIQUIDS, GREASE

- GASOLINE
- PAINTS
- OILS,ETC.



1-20-C

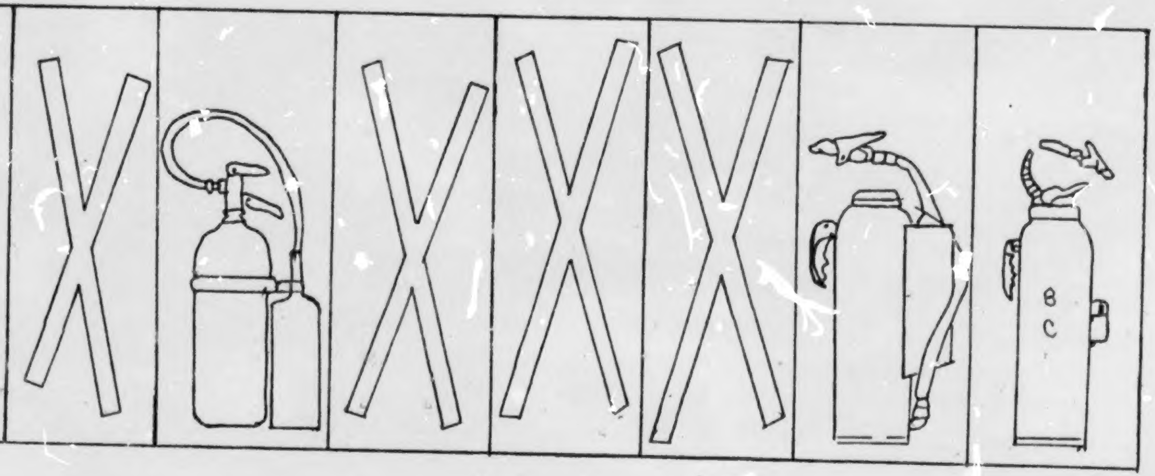
C

CLASS C FIRES

USE THESE EXTINGUISHERS

ELECTIRICAL EQUIPMENT

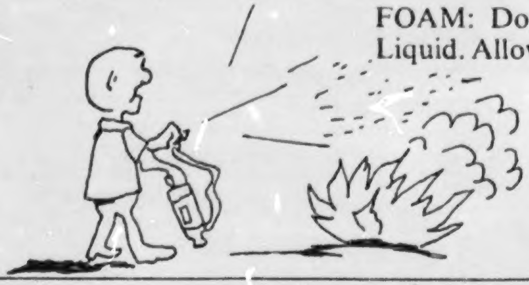
- MOTORS
- SWITCHES ETC.



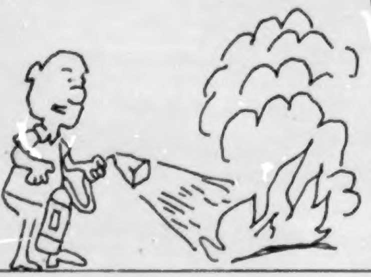
1-20-d

KIND OF FIRE		APPROVED TYPE OF EXTINGUISHER						
DECIDE THE CLASS OF FIRE YOU ARE FIGHTING...	...THEN CHECK THE COLUMNS TO THE RIGHT OF THAT CLASS	MATCH UP PROPER EXTINQUISHER WITH CLASS OF FIRE						
		FOAM Solution of Aluminum Sulphate and Bicarbonate of Soda	CARBON DIOXIDE Carbon Dioxide Gas Under Pressure	SODA ACID Bicarbonate of Soda Solution and Sulphuric Acid	PUMP TANK Plain water	GAS CARTRIDGE Water Expelled by Carbon Dioxide Gas	MULTIPURPOSE DRY CHEMICAL	ORDINARY DRY CHEMICAL

HOW TO OPERATE



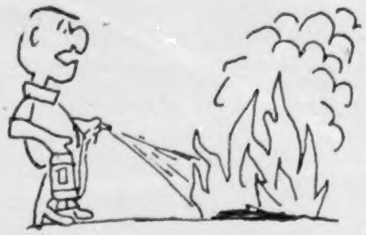
FOAM: Don't Play Stream into the Burning Liquid. Allow Foam to Fall Lightly on Fire.



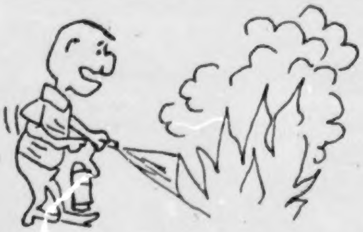
CARBON DIOXIDE: Discarge as

Close to Fire as Possible. First at Edge of Flames

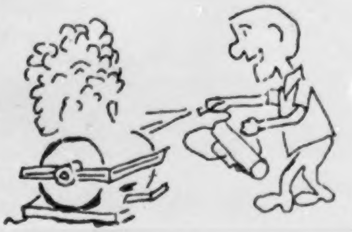
and Gradually Forward and Upward



SODA-ACID, GAS CARTRIDGE: Direct Stream at Base of Flame



PUMP TANK: Place Foot on Footrest and Direct Stream at Base of Flames

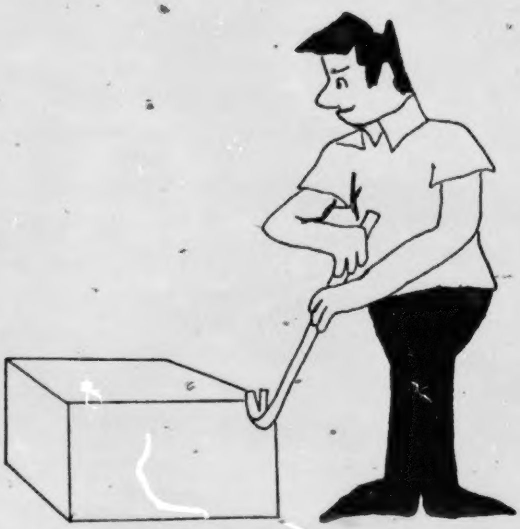


DRY CHEMICAL: Direct at the Base of the Flames. In the Case of Class A Fires, Follow

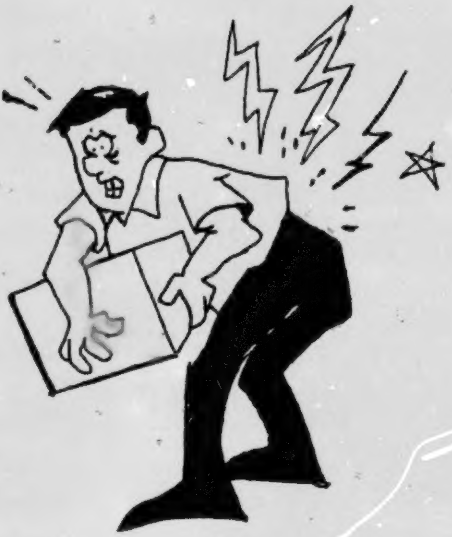
Up by Directing the Dry Chemicals

at Remaining Material That is Burning

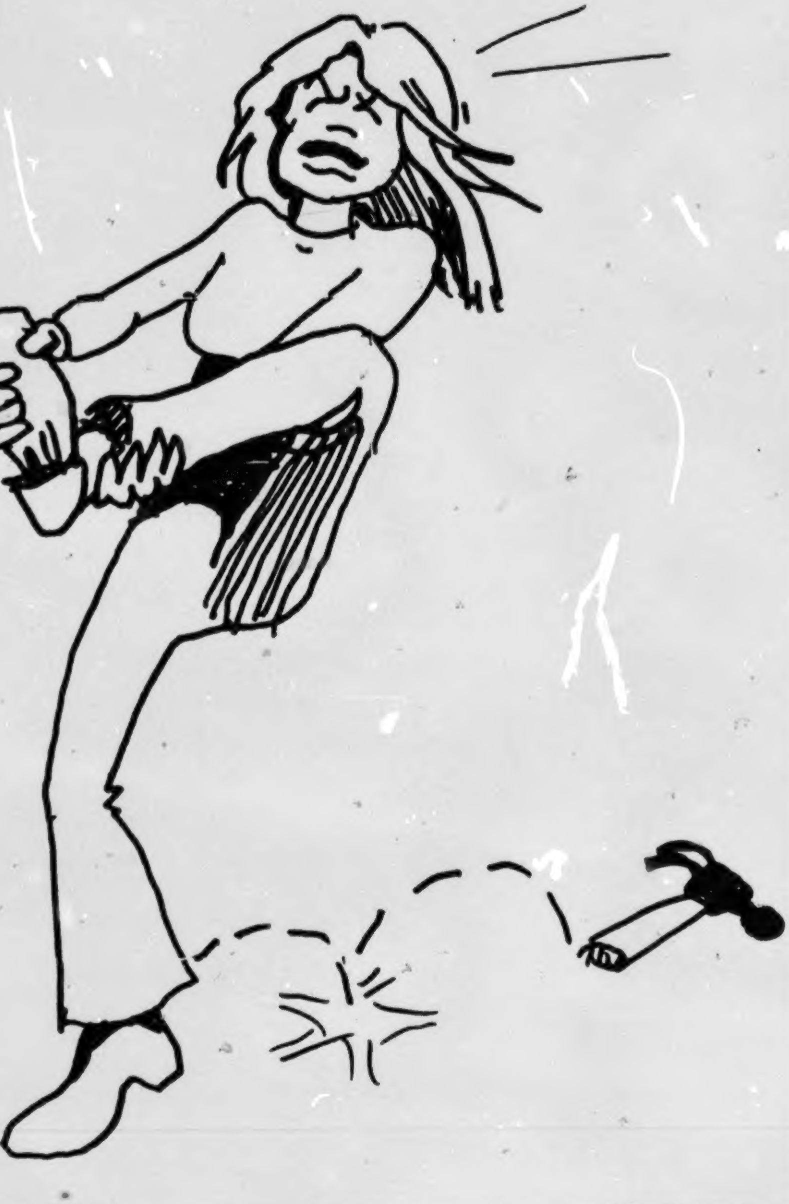
(Manual Handling of Materials)



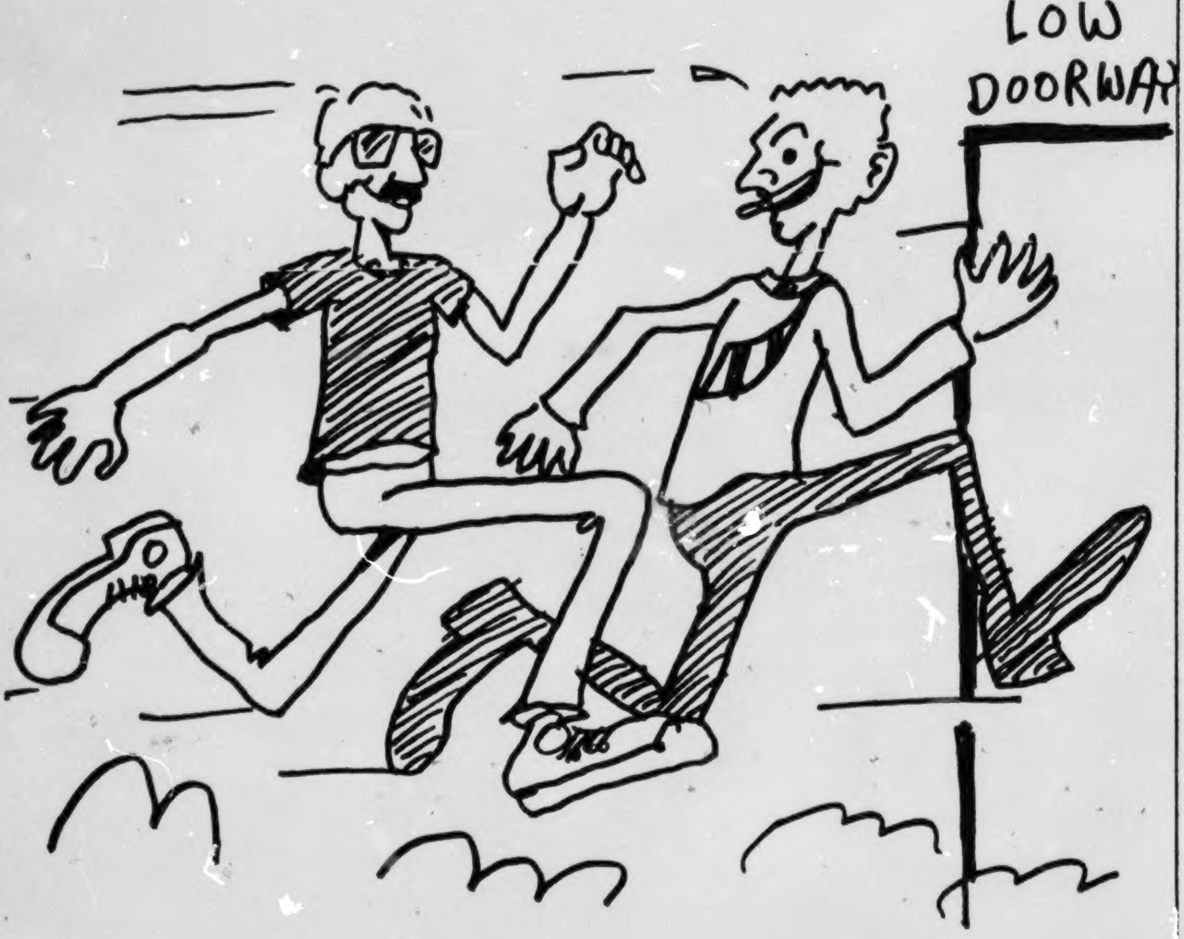
Muscular strain and physical overexertion.



Pinching or smashing of toes and fingers is painful and sometimes crippling.



Horseplay also causes injuries on the job.


LOW DOORWAY

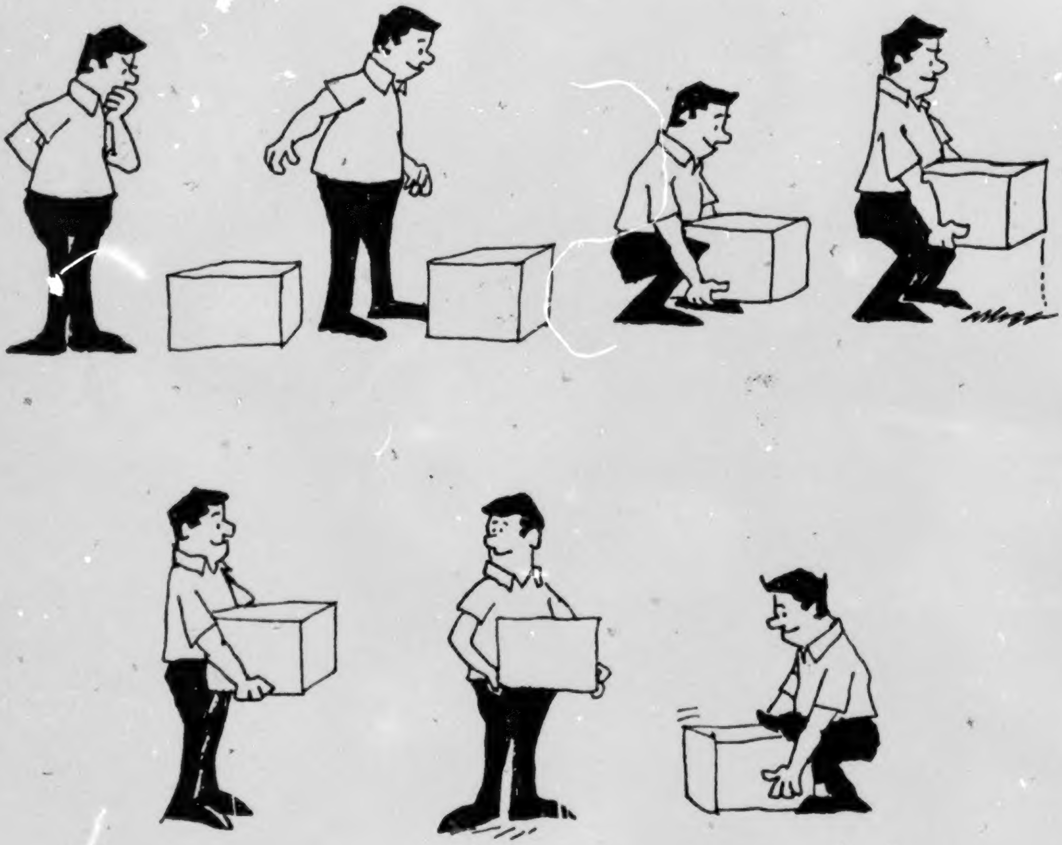
Proper Lifting Method

a. Test weight of item

b. Have good footing

c. Squat with knees in front and slightly apart, back straight, arms extended.

LIFT WITH LEGS



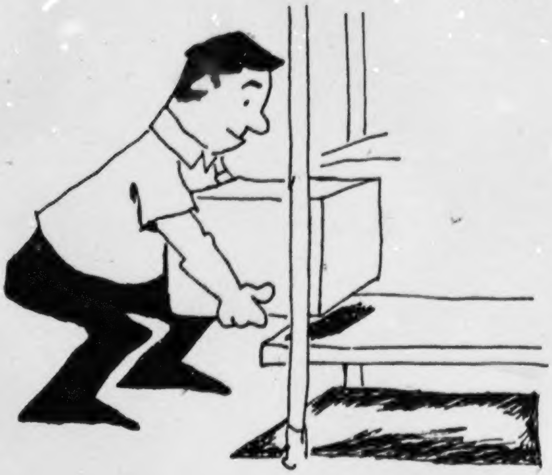
Proper method for moving material at arm level.

a. Test weight of item

b Lift side of material toward you

c. Slide to edge of support

d Let legs support the weight

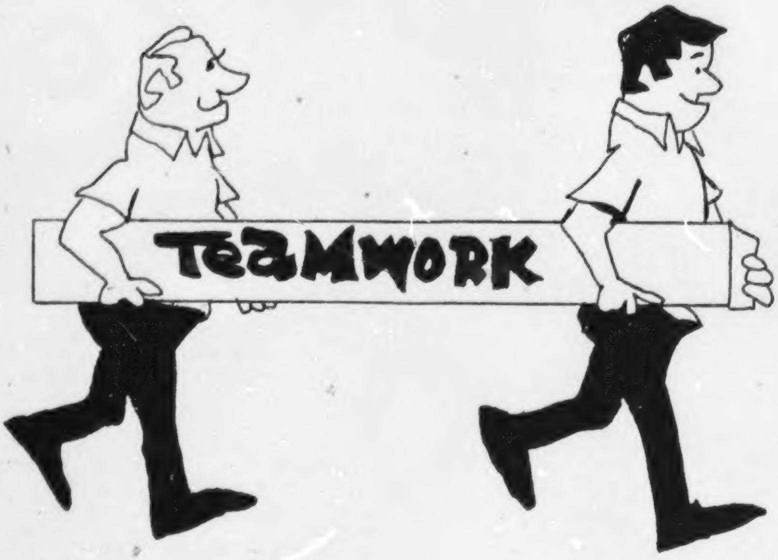


MOVING MATERIALS AT HIGHER THAN HEAD LEVEL---

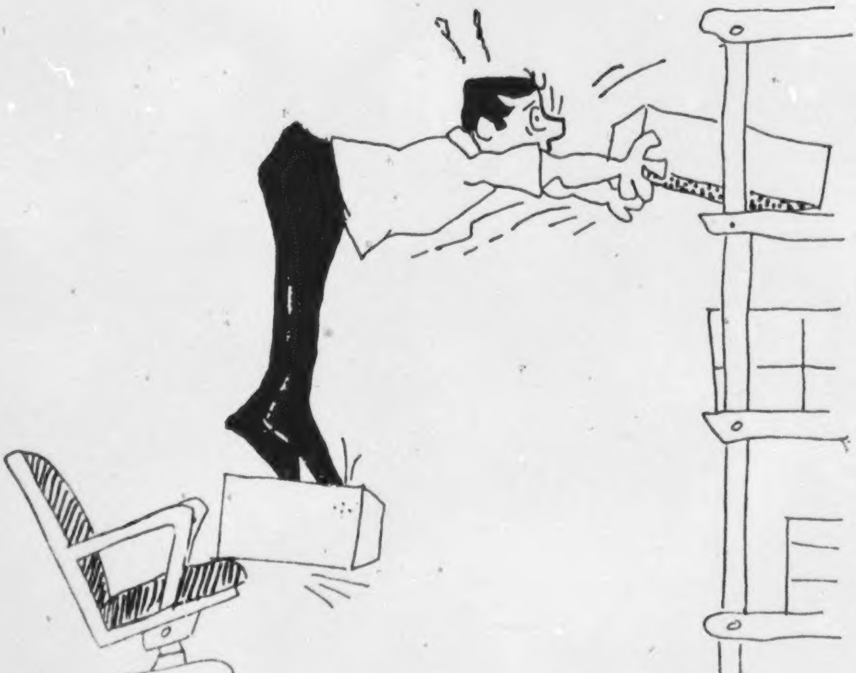
a. Use assistance of another person

b. Use special handling equipment for heavy material

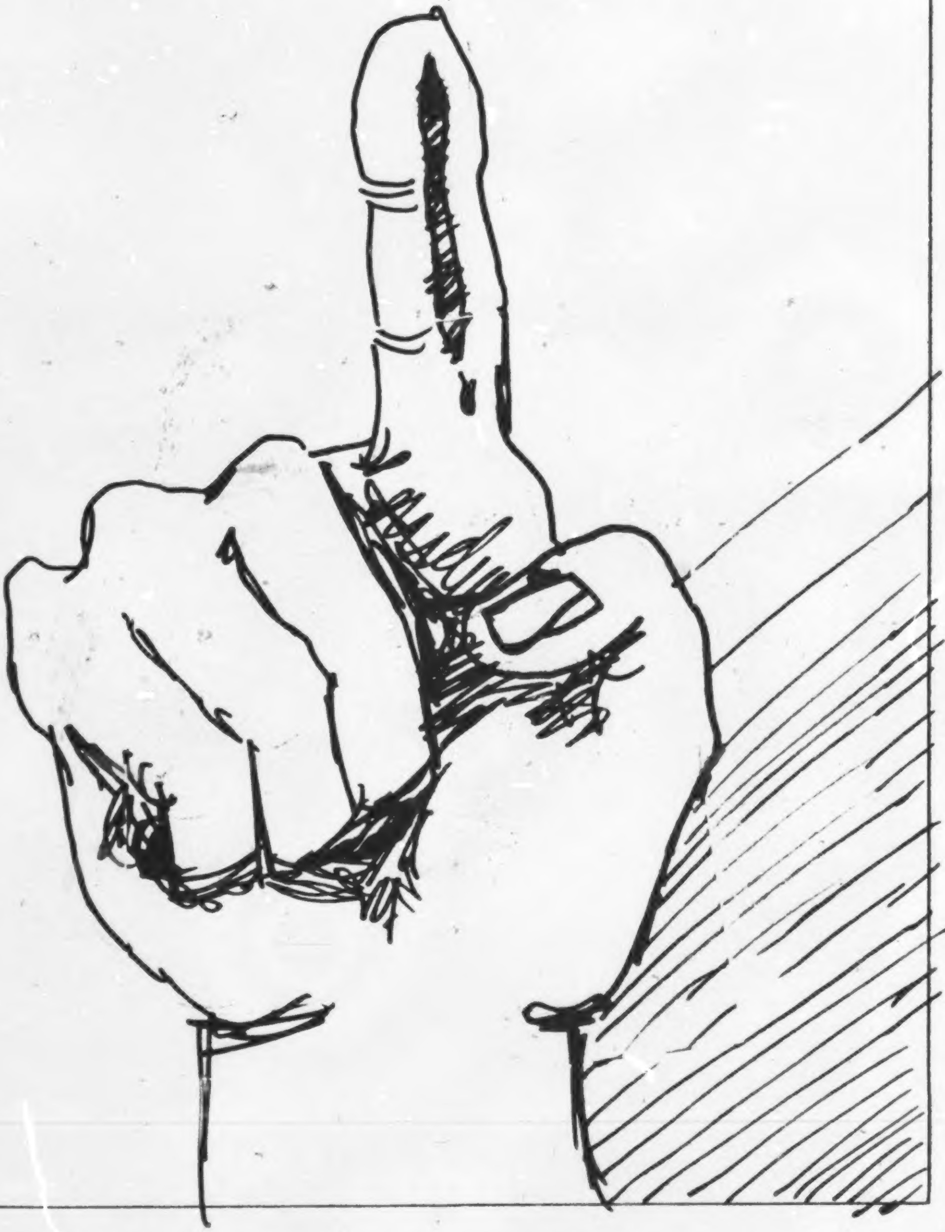
c. Use ladders with care



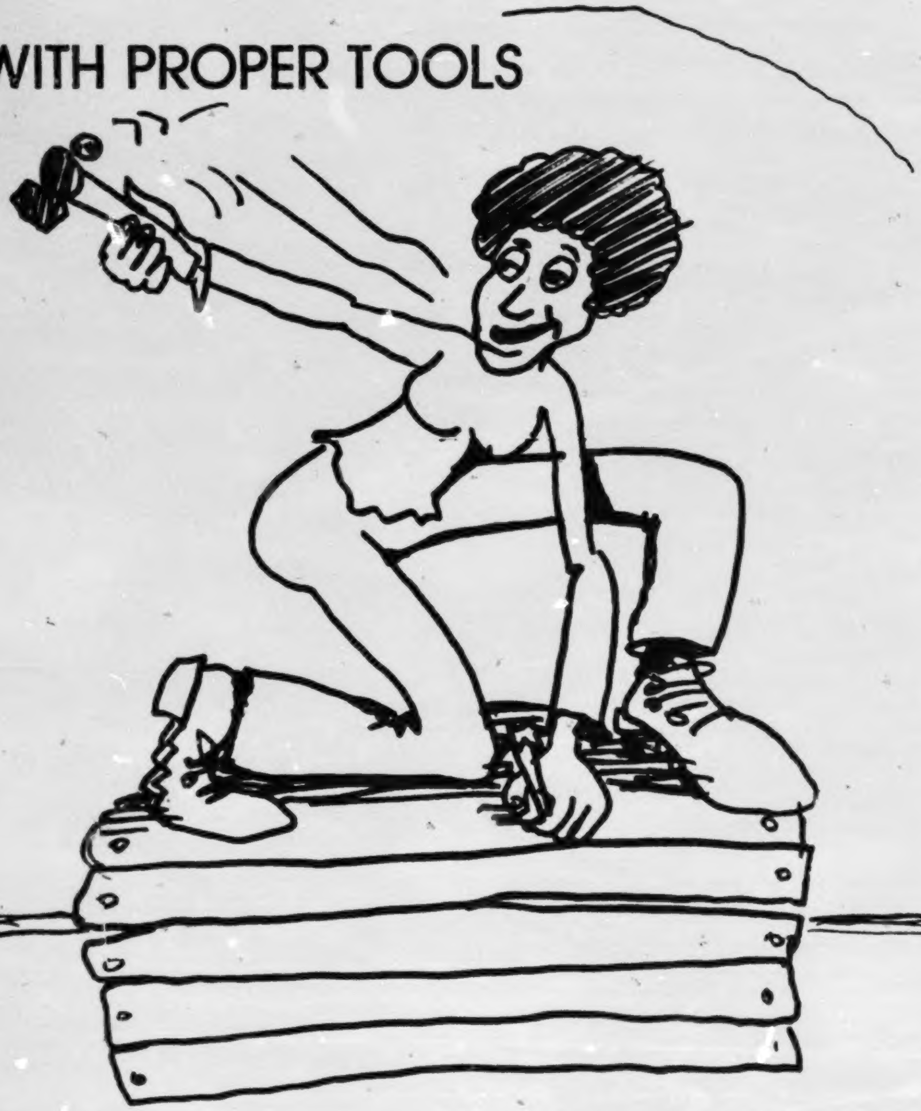
NEVER CARRY MATERIALS UP AND DOWN LADDERS--HAND BOXES TO PERSON ON FLOOR



NEVER USE DOUBLE EDGE RAZORS FOR OPENING PAPER CARTONS

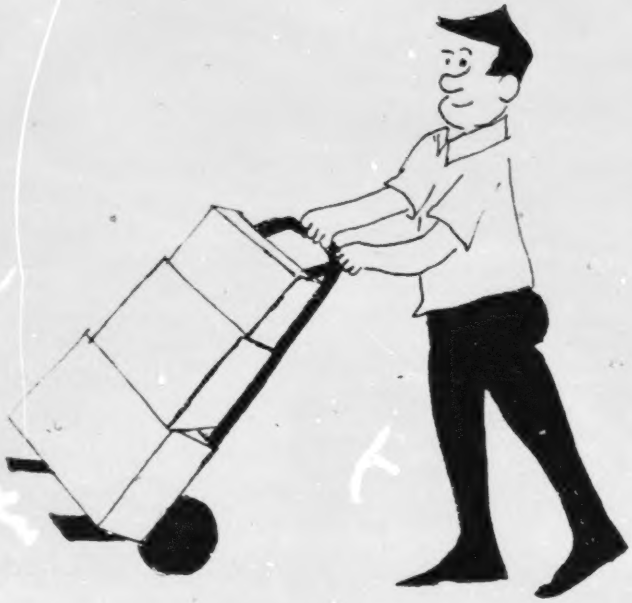


OPEN WOODEN BOXES AND CRATES WITH PROPER TOOLS



LESSON TITLE:

MACHINE HANDLING OF MATERIAL



EQUIPMENT USED IN MATERIAL HANDLING:

1. Hand Equipment

2. Powered Equipment

a. Rules for safe operation of wheelbarrows.

1. If more than one type is available, select the one best suited for the work to be done.

2. Check its condition for safe operation
   a. handles not cracked
   b. bolts secure
   c. tires inflated properly
   d. handguards in place

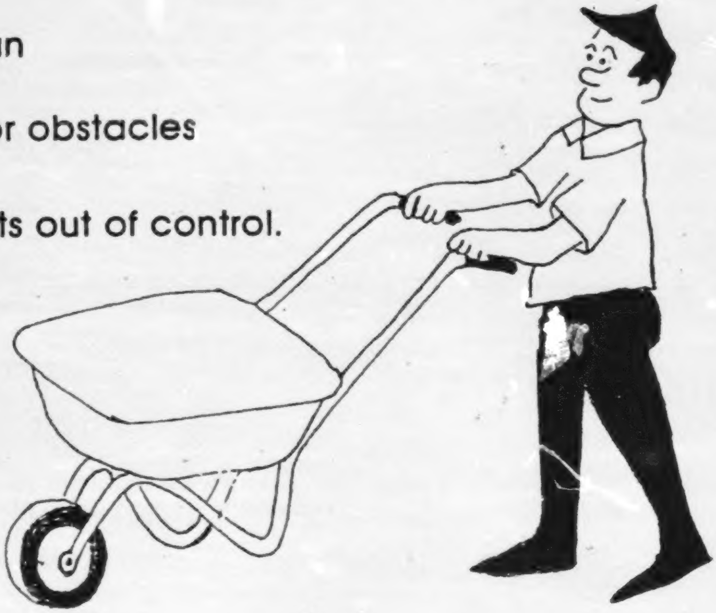
3. Place weight of load over wheel

4. Use two steps for starting to move
   a. lift slowly to balance point
   b. accelerate slowly

5. Walk do not run

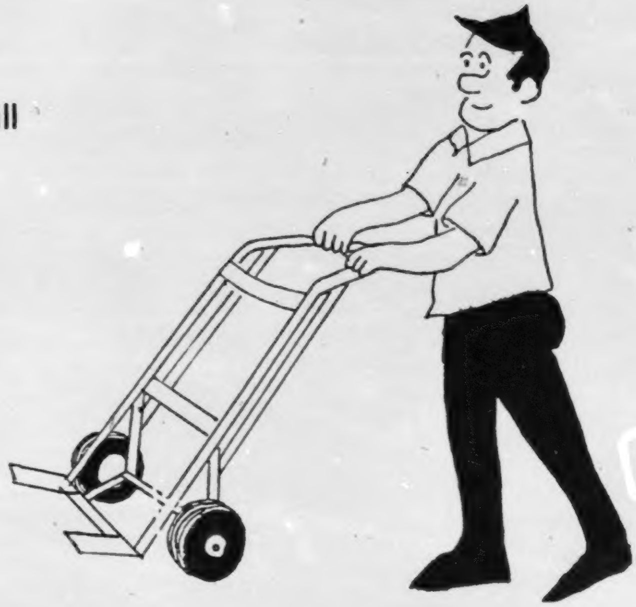
6. Check path for obstacles

7. Drop it if it gets out of control.



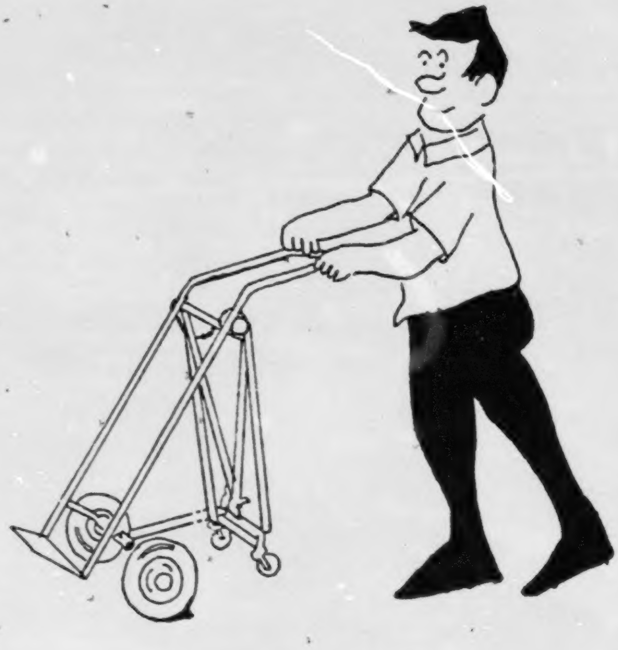
b. Rules for safe operation of two-wheel hand trucks.

1. There are many special purpose types. Some, for example, designed for kegs, drums, and barrels. Select the correct type for the material to hauled.
2. Check for defects
3. Keep center of gravity low as possible (place heavy items on bottom)
4. Don't overload
5. Balance load laterally
6. Secure the load
7. Push - except uphill
8. Walk don't run



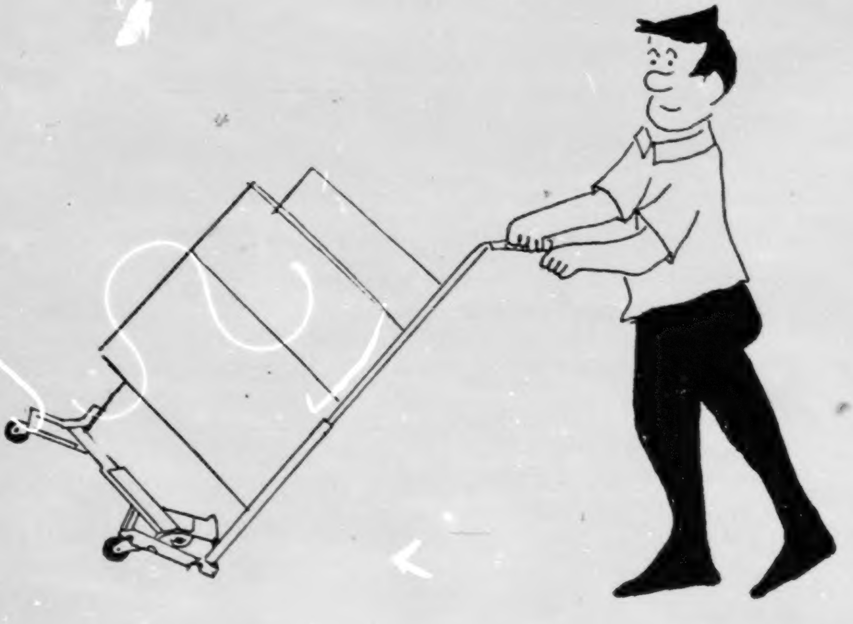
c. Rules for safe operation of four-wheel handtrucks.

1. Check for defects
2. Block wheels when loading
3. Balance the load
4. Keep load below eyelevel or use another worker as a safety guide
5. Push-unless pull handle is provided
6. When parked insure that pull handle is locked in up position.



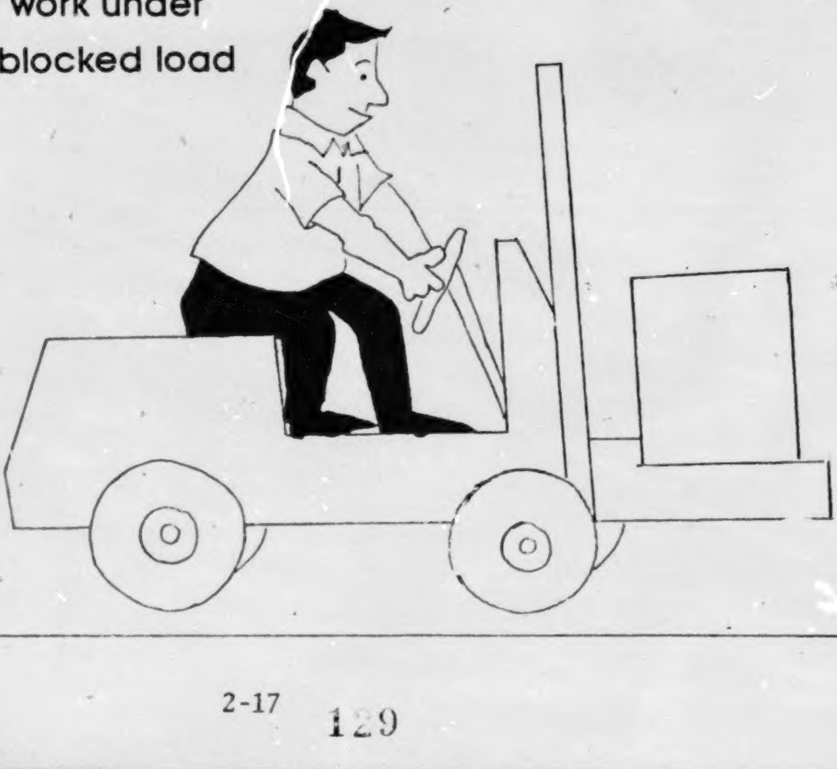
d. Rules for safe operation of dollies.

1. Check for defects
2. Move and guide by pushing
3. If item is bulky and heavy use second man for better control



e. Rules for safe operation of jacks.

1. Select a jack that has a capacity as great or greater than the load
2. Check for defects
3. Set on level base
4. Use wooden shim between jack head and load
5. Never jack at and angle
6. Operate jacking handle from the side
7. Operate slowly checking to see that load is secure
8. Block load when lifted, don't depend on jack to hold load up
9. Never work under an unblocked load

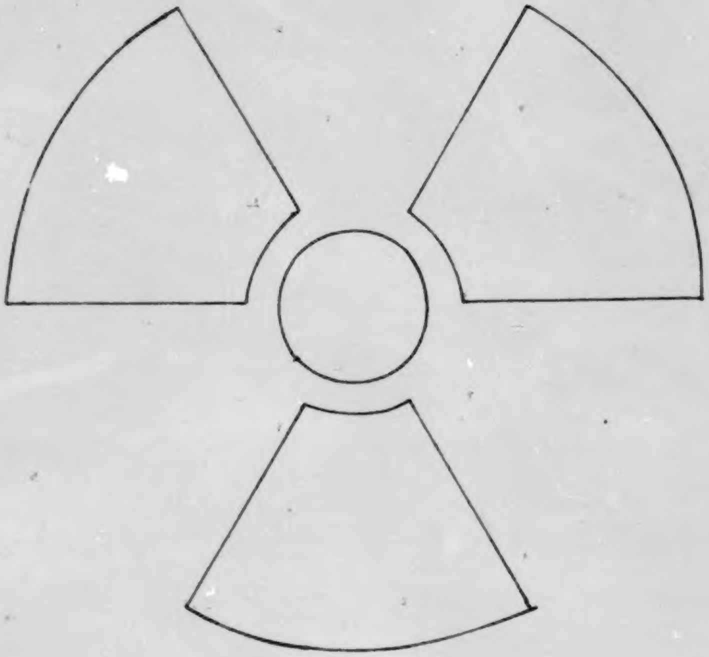


LESSON TITLE:

Handling of Hazardous Materials

DANGER
FLAMMAB
CAUTIO

Materials that present a radiation hazard should be marked with a radiation warning sign.



LABELS FOR BOTTLES

☐ RED -Flammable materials or extremely dangerous

☐ ORANGE-Dangerous area or energized Equipment

☐ YELLOW -Caution

☐ GREEN -First aid equipment

☐ BLUE -Equipment being repaired

Air Contaminates

a. Pneumoconiosis - coats the lungs and interferes with breathing may result in cancer.

b. Poisoning

c. Skin irritations and alergic reactions.

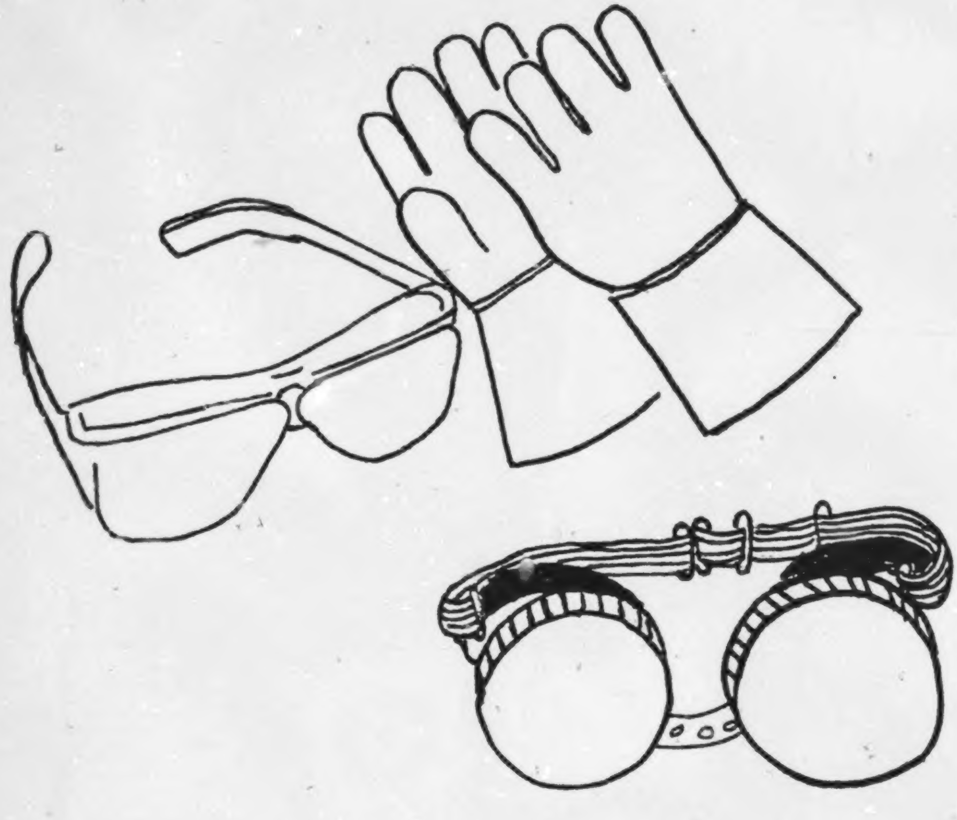
d. Bacterial and fungi infections.

e. Nose and throat irritations.

f. Cancer

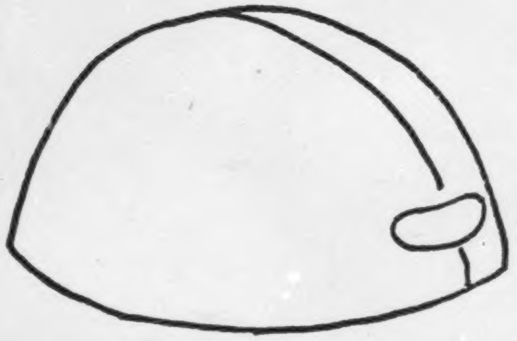
LESSON TITLE:

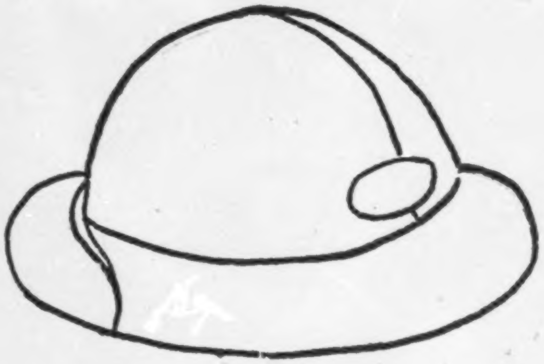
Personal Protective Equipment



Safety Hats are of 2 general types:

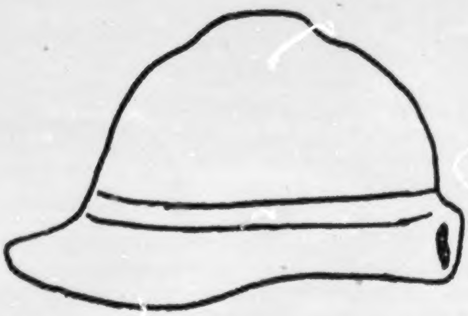
Brimless --- Full Brimmed





Hair protective devices are required by those persons with long hair.

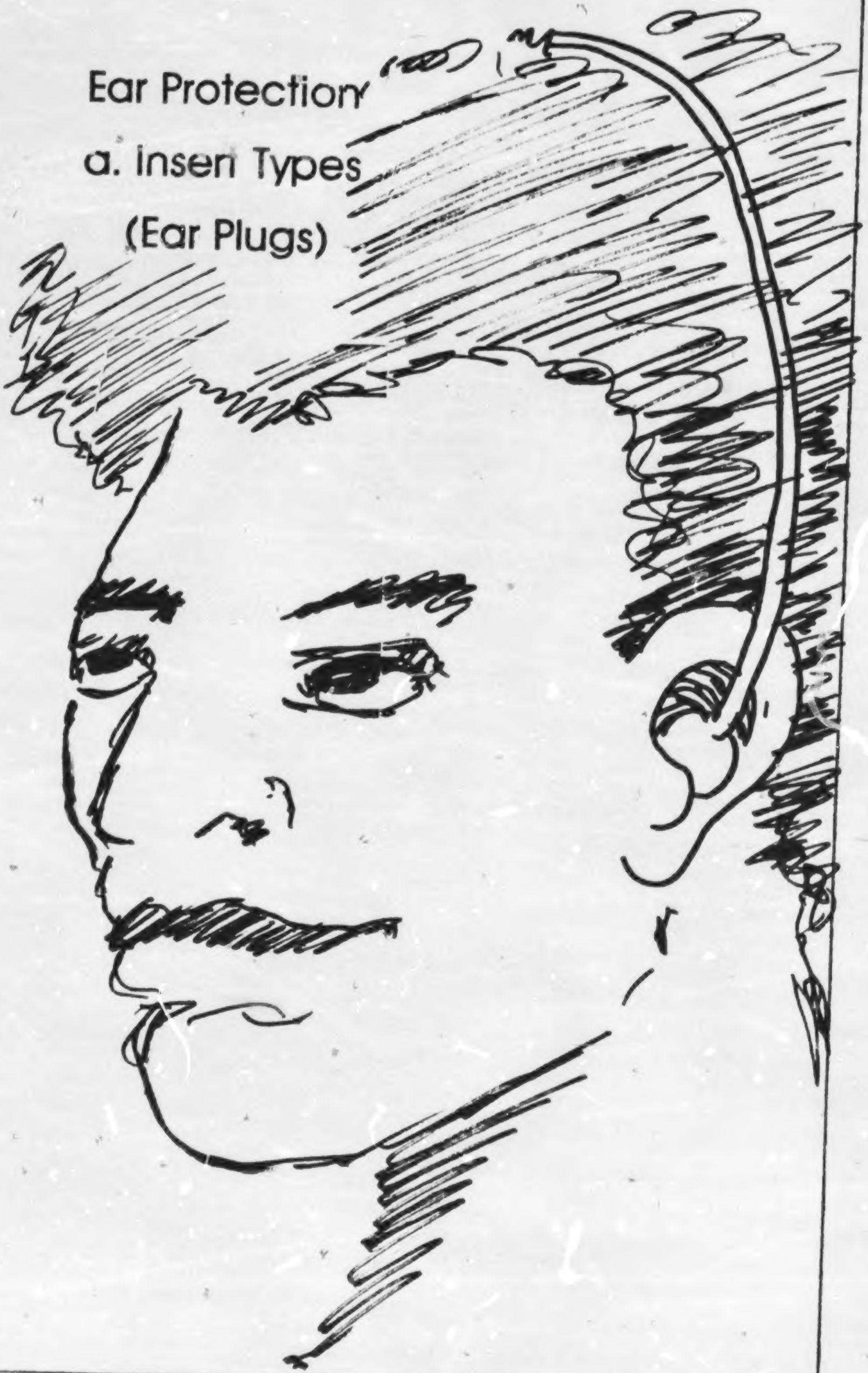
Safety Caps



Ear Protection

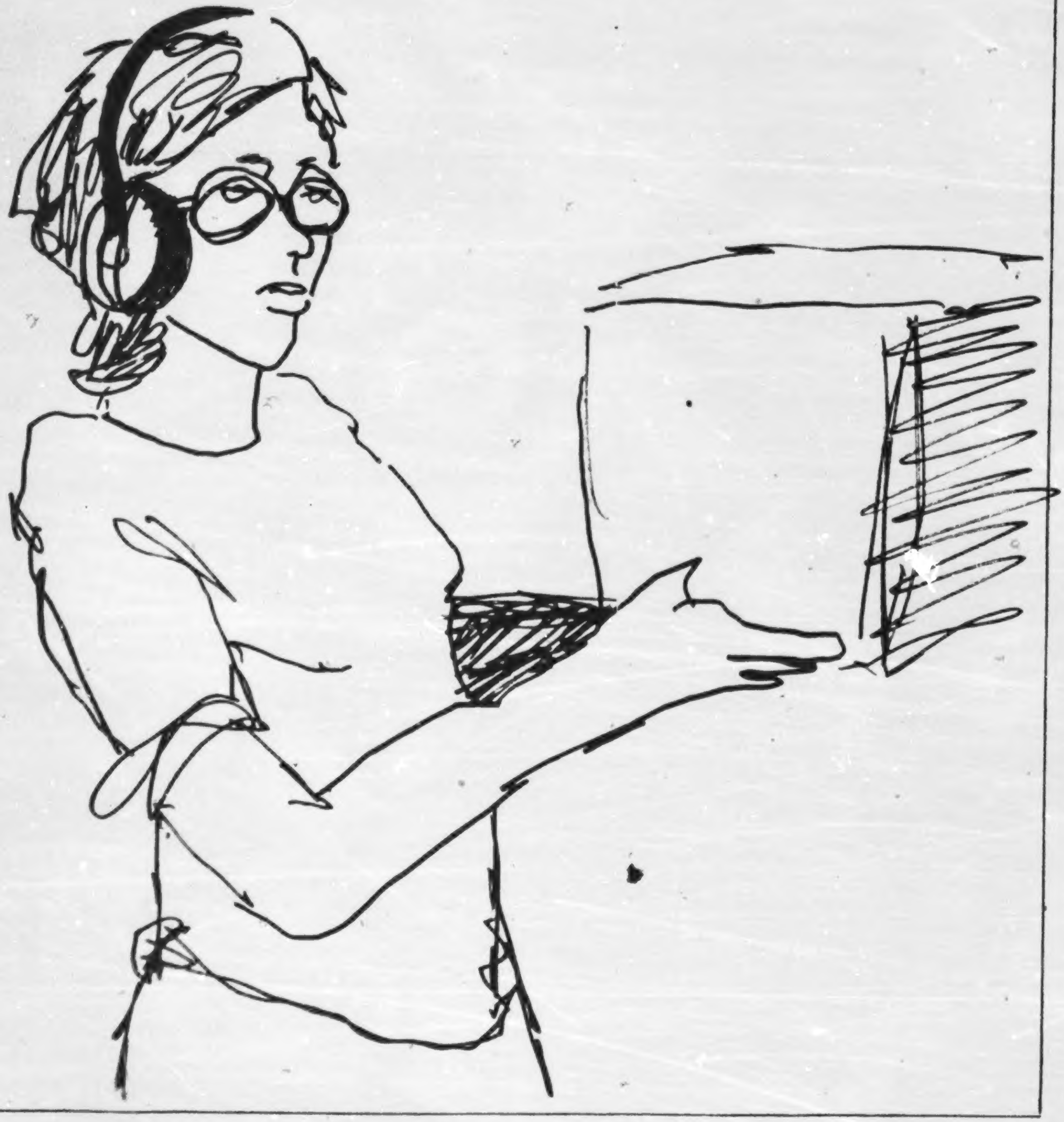
a. Insert Types

(Ear Plugs)



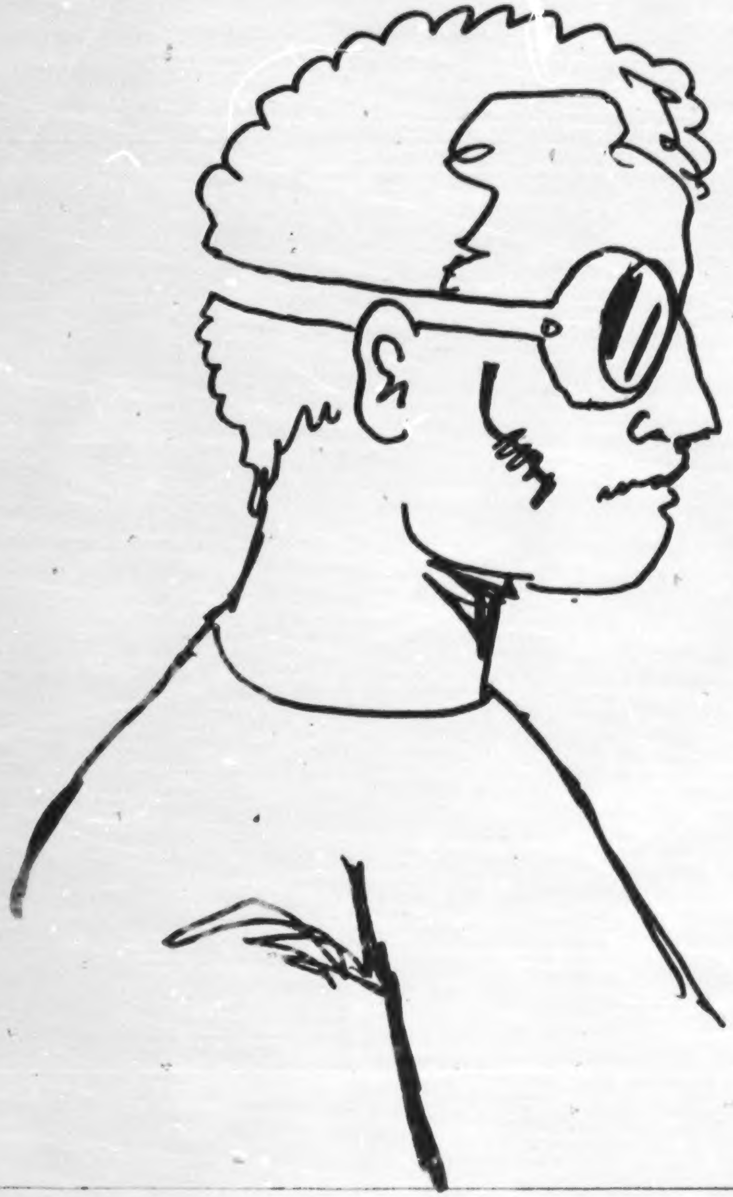
Ear Protection

b. Ear Muffs

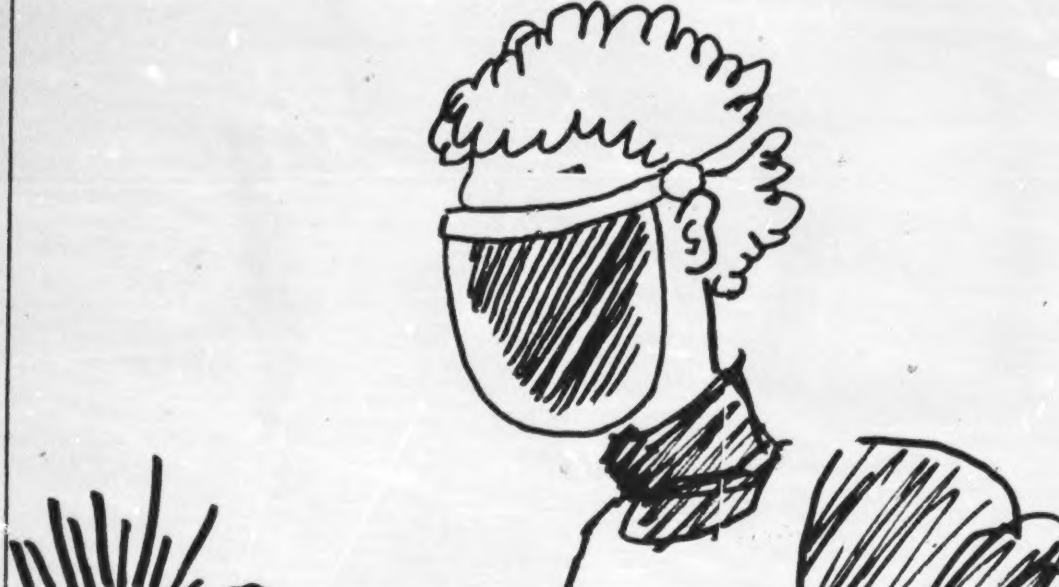


Eye Protection

Goggles



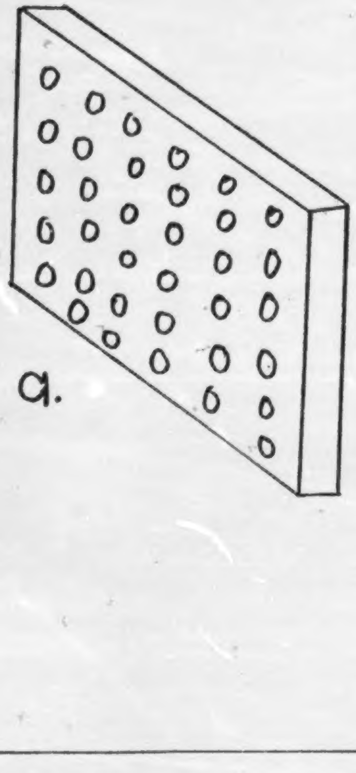
Eye and Face Protection
(Shields and Hoods)



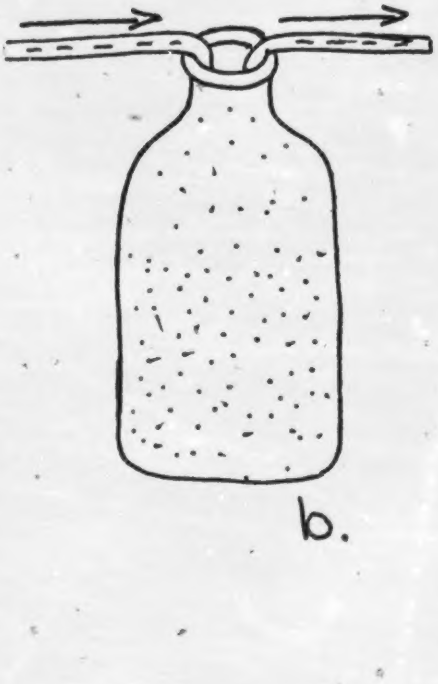
Air Purifying Equipment

a. Make use of mechanical filters to remove particulate matter such as dust, fumes, etc.

b. Use chemical sorbents for removing gases and vapors from air.



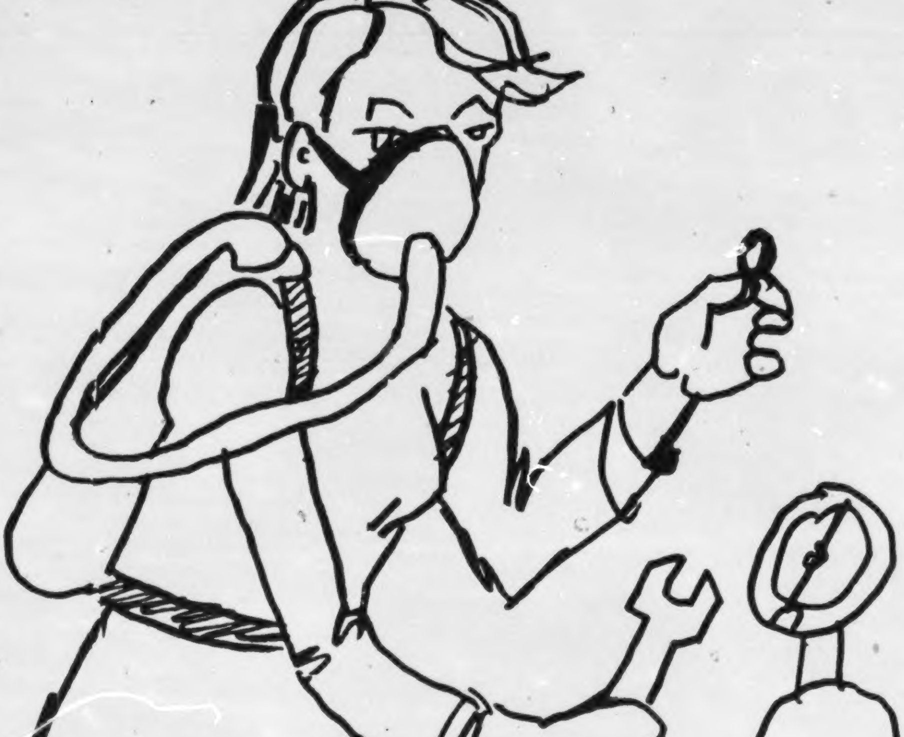
a.



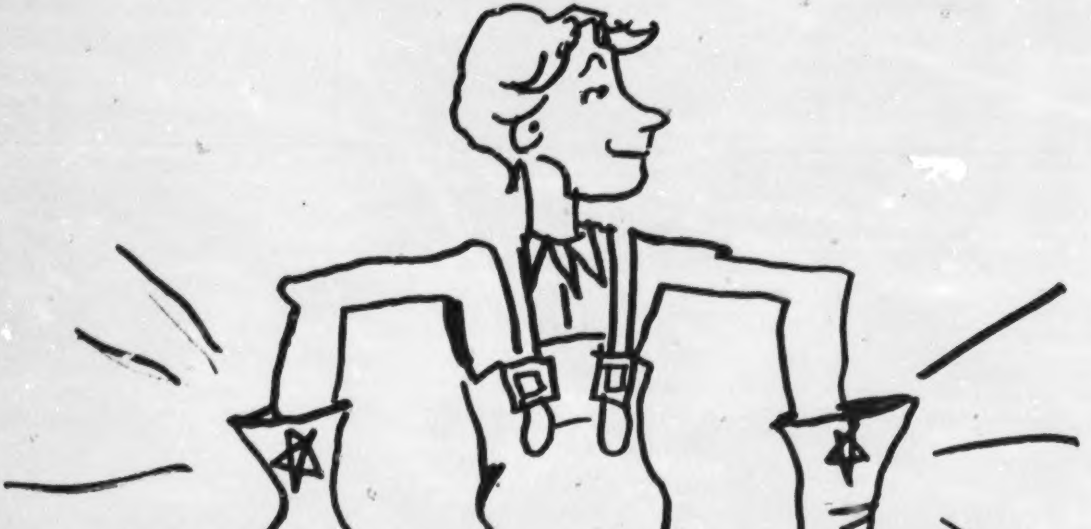
b.

Air Supplying Devices--

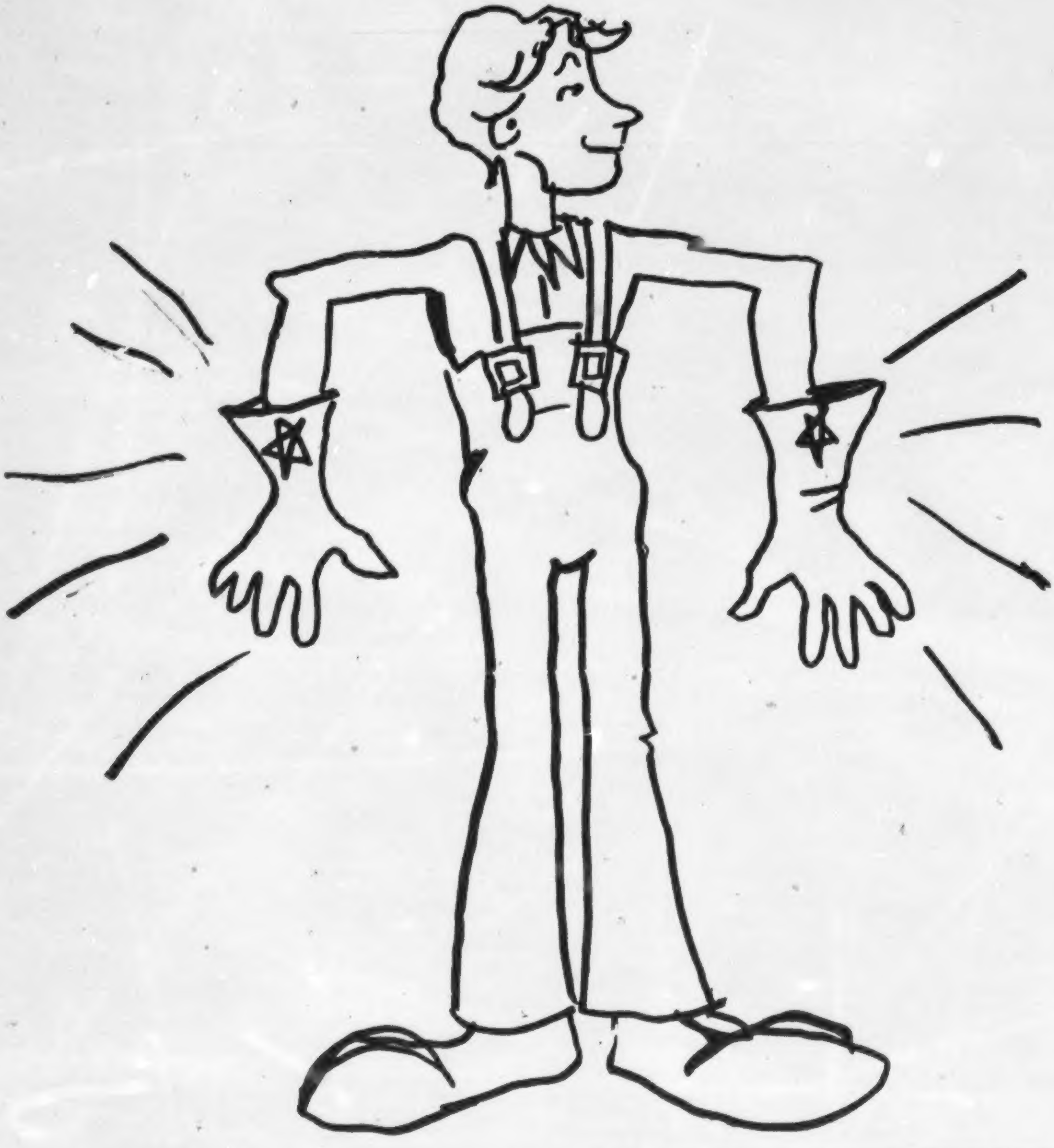
Supplies fresh air from an outside source.



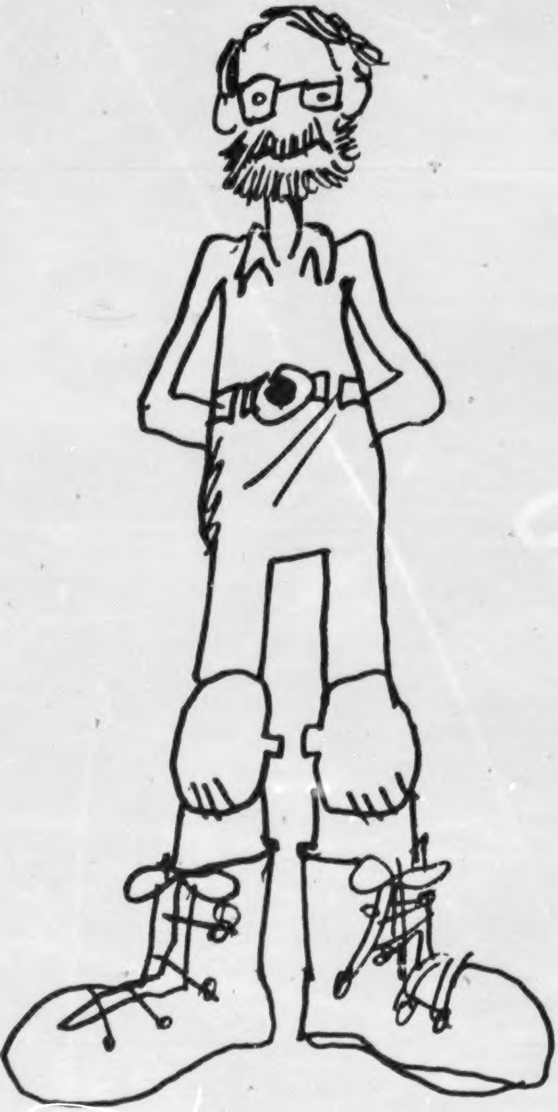
Hand Protectors



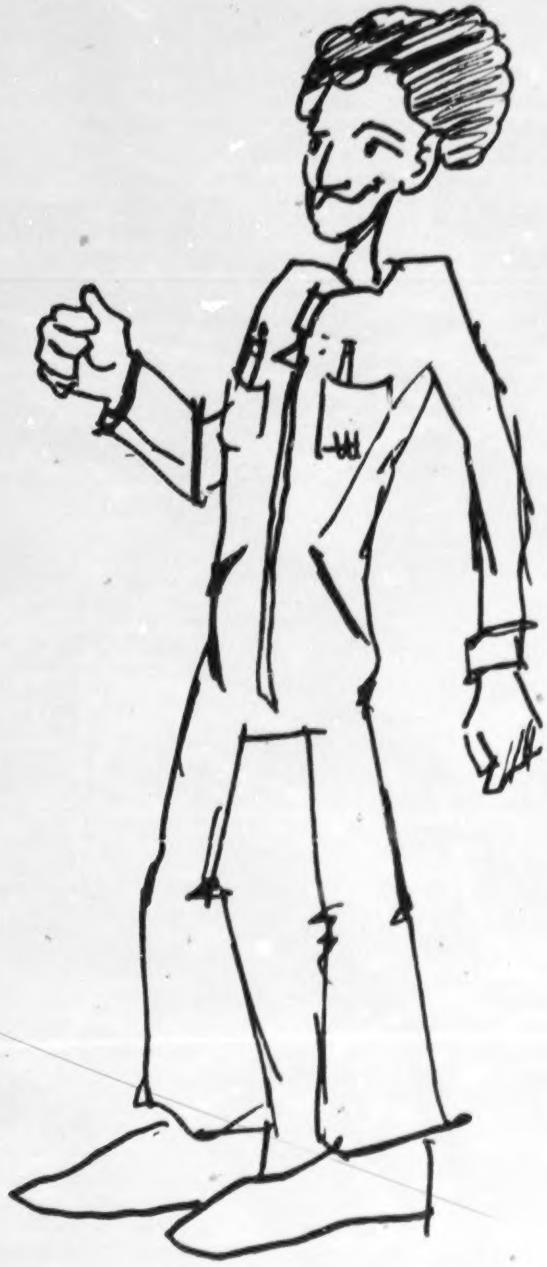
Hand Protectors



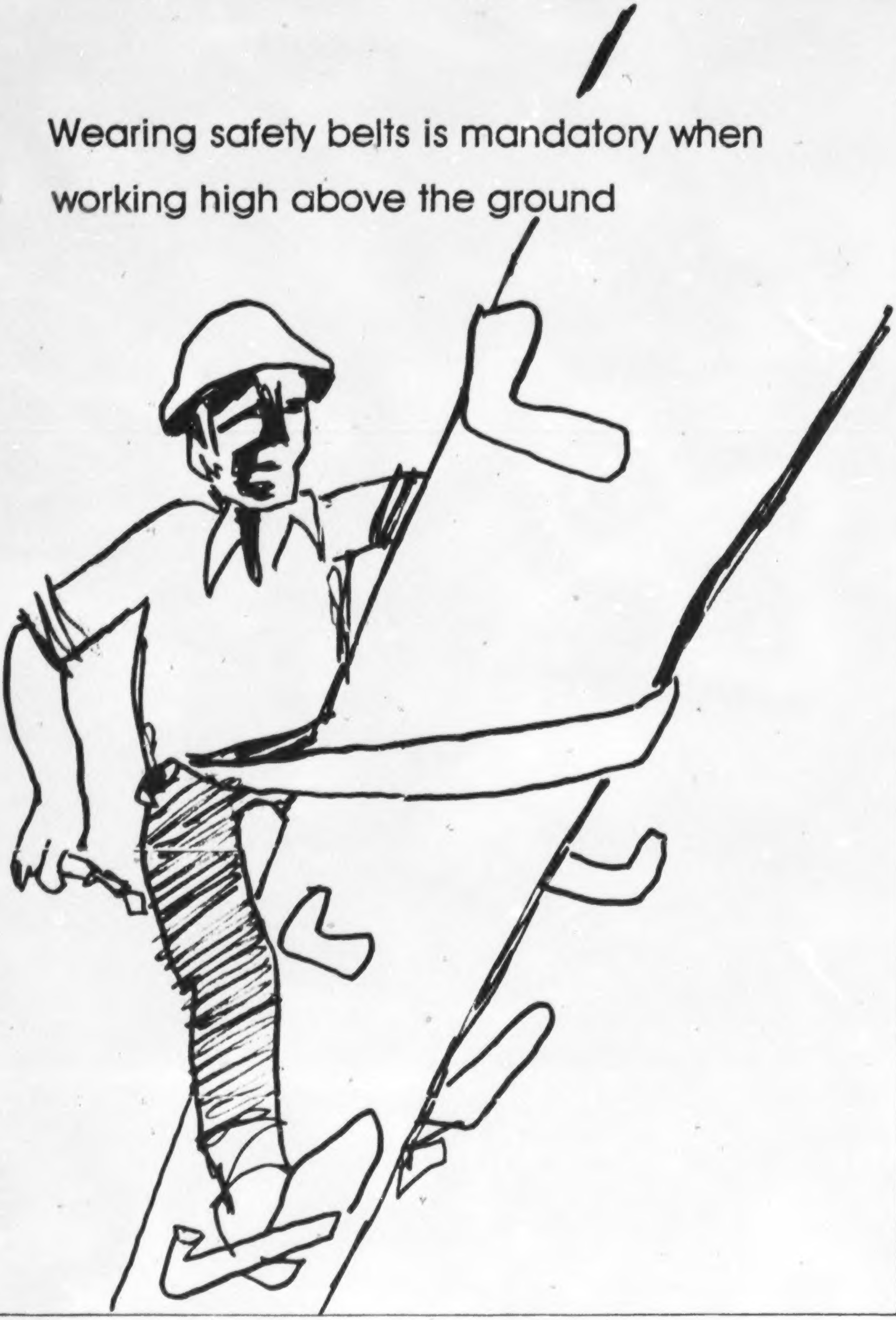
Feet and Leg Protectors



Protective Clothing

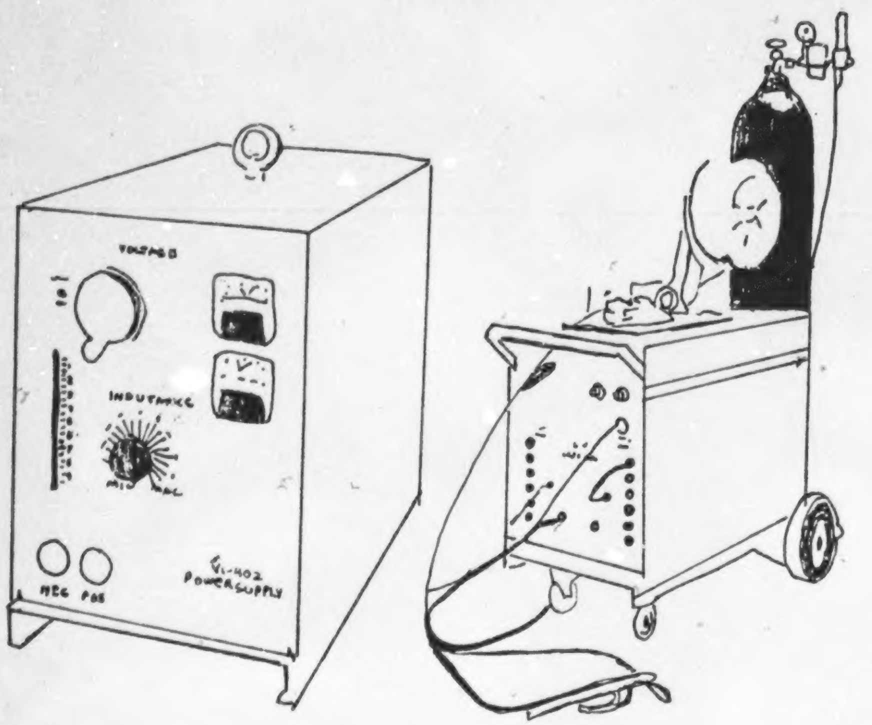


Wearing safety belts is mandatory when working high above the ground

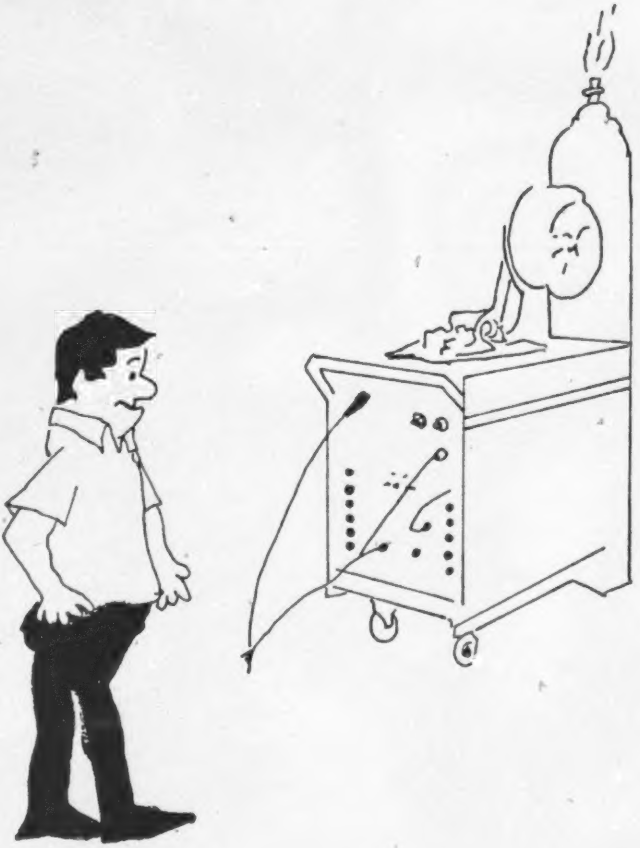


Lesson Title:

Machine Guards


INDUTANCE
MIN MAX
NEG POS
VI-402
POWERSUPPLY

Critical Hazards

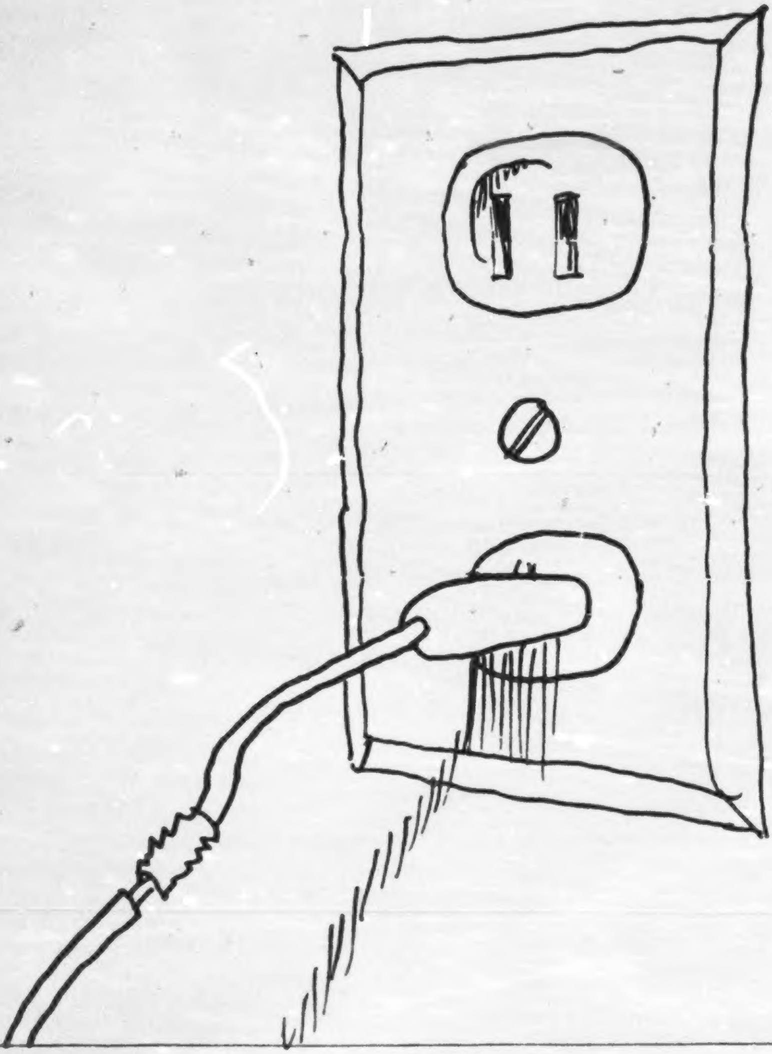


Three major causes of electrical shock

a. Ungrounded equipment

b. Inadequate guarding of exposed circuitry

c. Inadequate insulation of electrical
conductors

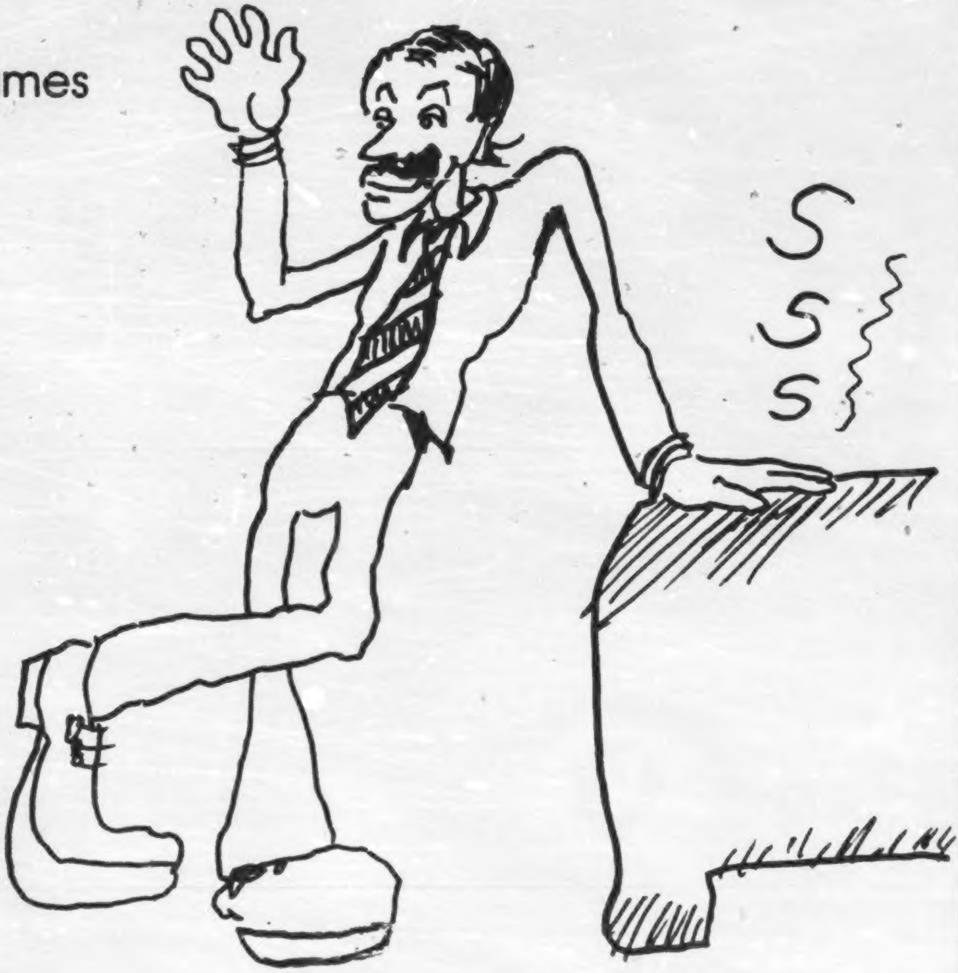


Burns are caused by contacting sources of heat

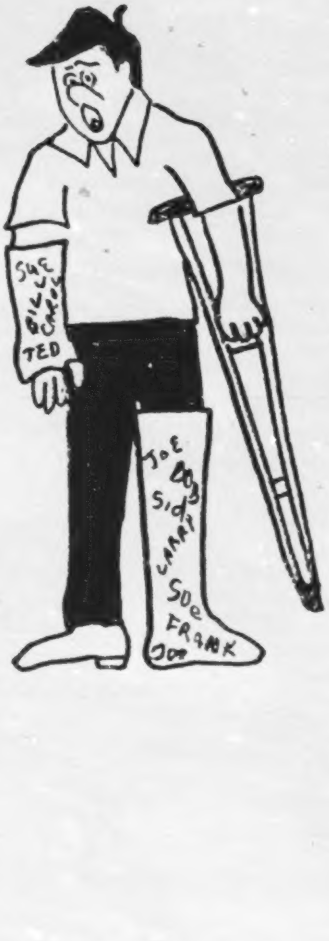
a. Material super heated by friction

b. Overheated electrical systems or devices

c. Flames

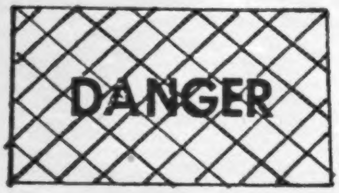


Operating Machines Improperly Causes Cuts, Bruises, Pinches and Crushing

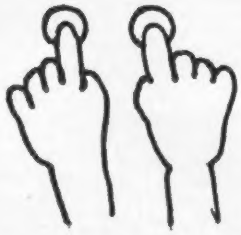

SUE
BILL
CAROL
TED
JOE
BOB
Sid
LARRY
Sue
FRANK
JOE

Four types of machine guards: Fixed--Interlocking--Automatic--Tripping

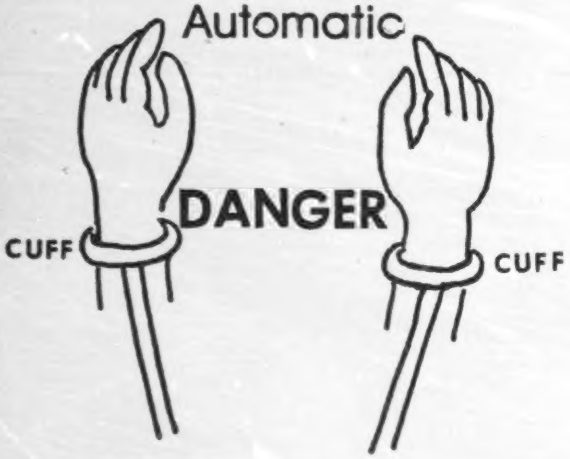
Fixed



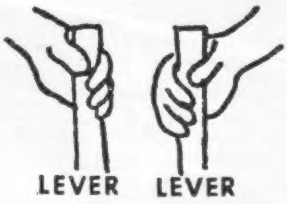
Interlocking



Automatic


DANGER
CUFF
CUFF

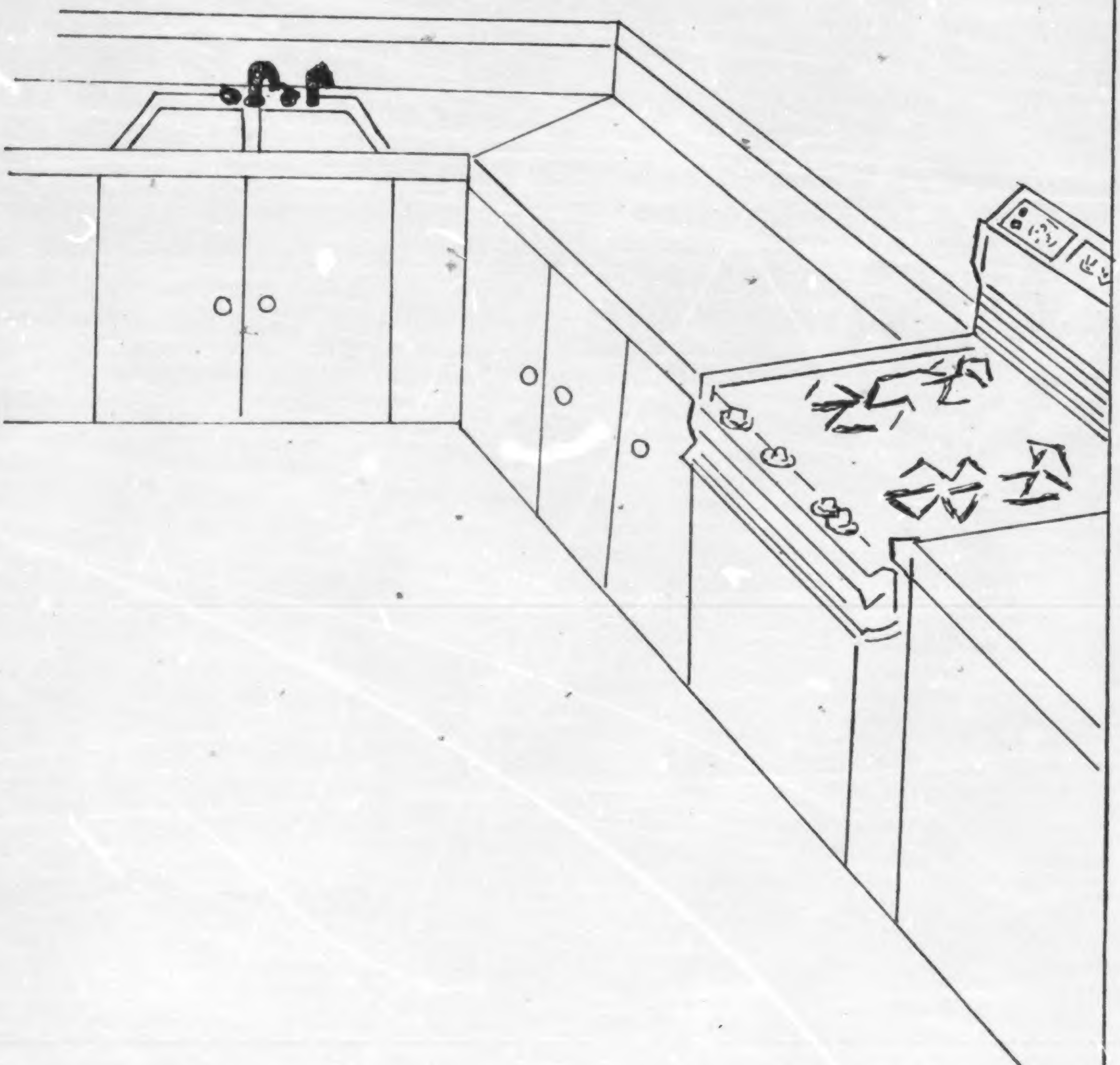
Tripping


LEVER
LEVER

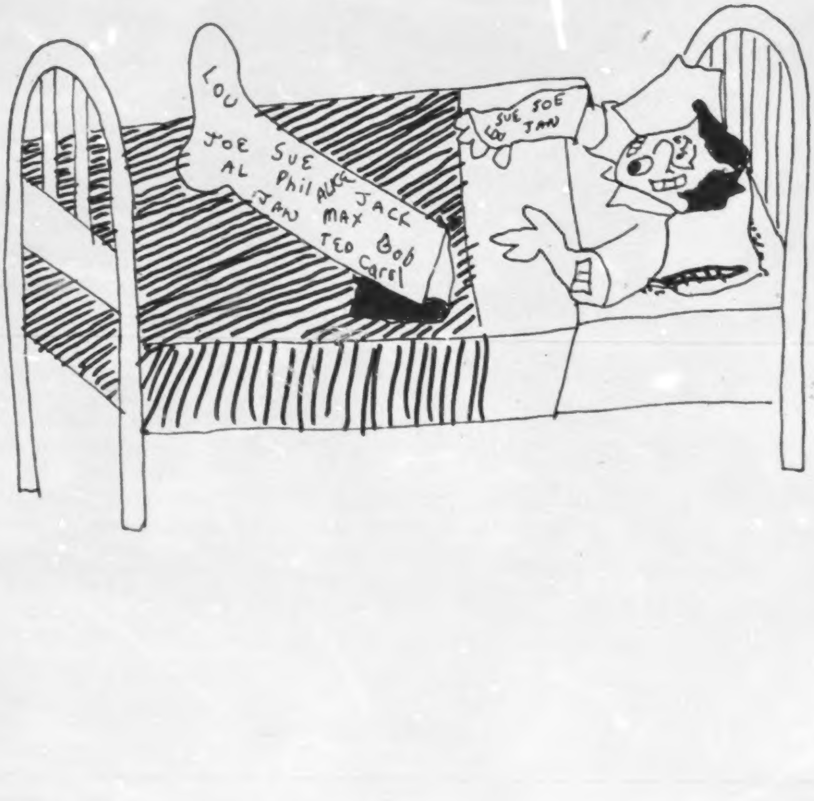
Lesson Title:

Housekeeping

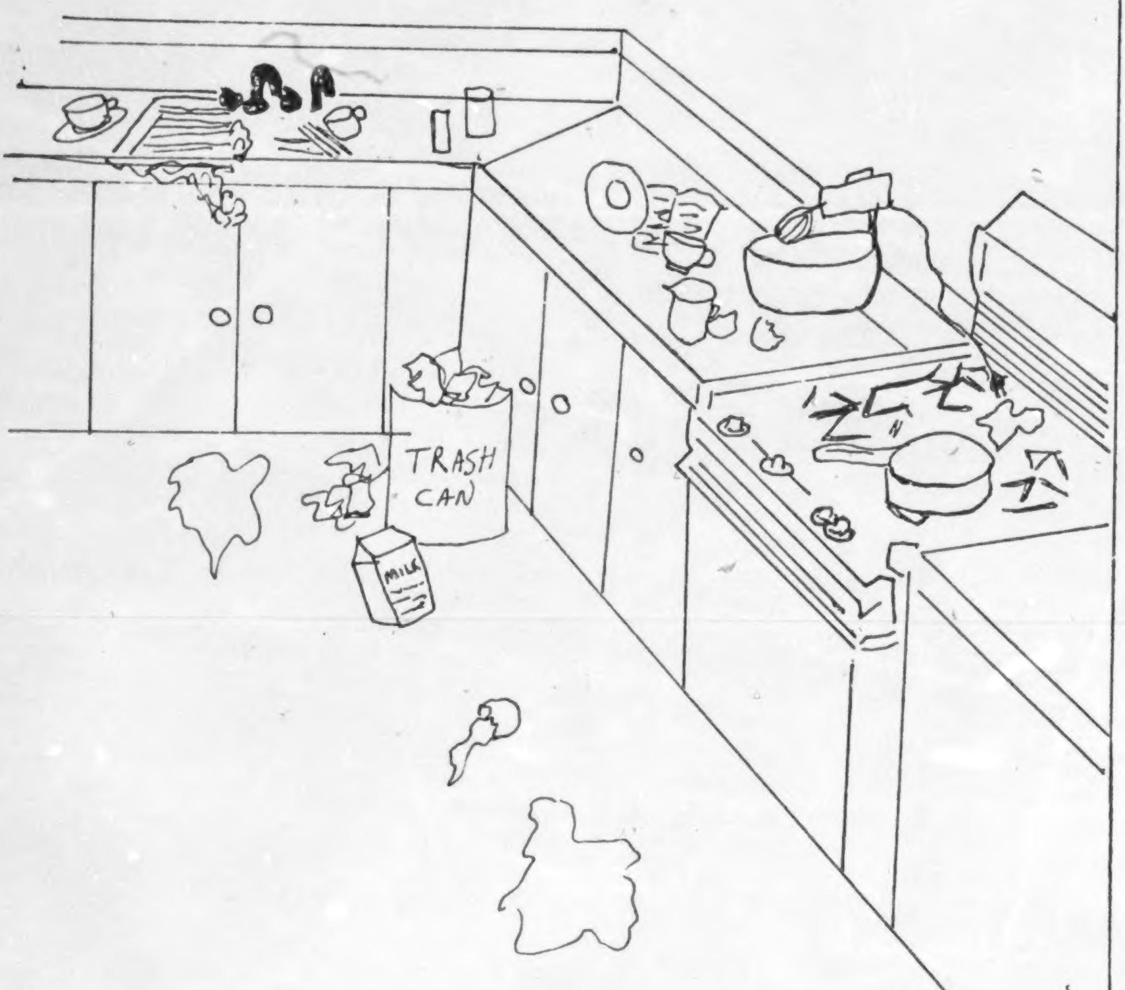
Good Housekeeping



Typical Accidents Due to Poor Housekeeping


LOU
JOE
SUE
AL
Phil
ALICE
JACK
JAN
MAX
TED
Bob
Carol
SUE
JOE
JAN
LOU

Typical Items of Unsafe Housekeeping


TRASH CAN
MILK

Lesson Title:

Review and Evaluation

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